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Introduction to GenAI and Chatbots for Healthcare Professionals

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Carolyn Smaka, AuD

Leigha Jansen, EdD, CPACC



Leigha Jansen, EdD, CPACC is the director of educational technology at Continued. With degrees from the University of Minnesota and Nova Southeastern, Dr. Jansen brings brains, heart, and over 20 years of experience to the table. Her passion is leveraging technologies, including artificial intelligence (AI), to deliver top-notch continuing education for adult learners nationwide.

A self-proclaimed lifelong learner, Dr. Jansen holds the CPACC credential and keeps digital accessibility at the forefront. She serves on the IACET Board of Directors and as an adjunct faculty member at Concordia University because she believes in the combined power of learning and technology to change lives for the better. At Continued and beyond, Dr. Jansen is an educational and AI ambassador who brings knowledge, compassion, and vision to every project. And her friendly Midwestern warmth makes everyone feel genuinely welcome.



Carolyn Smaka, AuD

Carolyn Smaka, AuD, is the Editor-in-Chief at Continued. Leading a dynamic team of editors, she directs the development of world-class continuing education course libraries that span multiple disciplines. Prior to Continued, Carolyn provided audiology care in diverse clinical settings and served in leadership roles in the hearing industry. Her dedication to audiology is reflected in extensive volunteer work with professional associations, and she is a past recipient of the Joel Wernick Award from the Academy of Doctors of Audiology.

Carolyn is passionate about the transformative potential of artificial intelligence (AI) and is excited by its countless applications in the education and healthcare sectors. As an AI ambassador, she continuously upskills through professional development, research, and early adoption of AI tools for work and play. She leads her team's efforts in incorporating AI into their workflows to streamline processes and bolster staff engagement.

Disclosures

Presenter Disclosures: Leigha Jansen and Carolyn Smaka are employees of Continued. The presenters do not have any relevant non-financial relationships to disclose.

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Learning Outcomes

After this course, you will be able to:

1. Define AI and list current AI applications in healthcare.
2. List uses of GenAI to increase the efficiency and/or creativity of professional tasks.
3. Generate effective prompts to engage in meaningful and productive AI-driven conversations.
4. Explain the limitations of GenAI and strategies to mitigate risks.

Disclaimer

Generative AI is a rapidly evolving topic
and everything is subject to change.



AI Definition

Artificial intelligence, or AI, is the development of computer systems that are able to perform tasks that typically require human intelligence.

- Visual perception / Pattern recognition
- Speech recognition / Natural language processing
- Decision-making
- Language translation

AI & Data

- AI systems analyze huge datasets.
- AI systems find patterns and relationships in the datasets, which it can use to make predictions or decisions.
- The more data an AI system has access to, the better it can learn and improve its performance.

Everyday AI

- Virtual assistants
- Predictive text
- Email spam filters
- Custom newsfeeds
- GPS systems

Customer reviews

★★★★☆ 4.7 out of 5

238,283 global ratings

Customers say

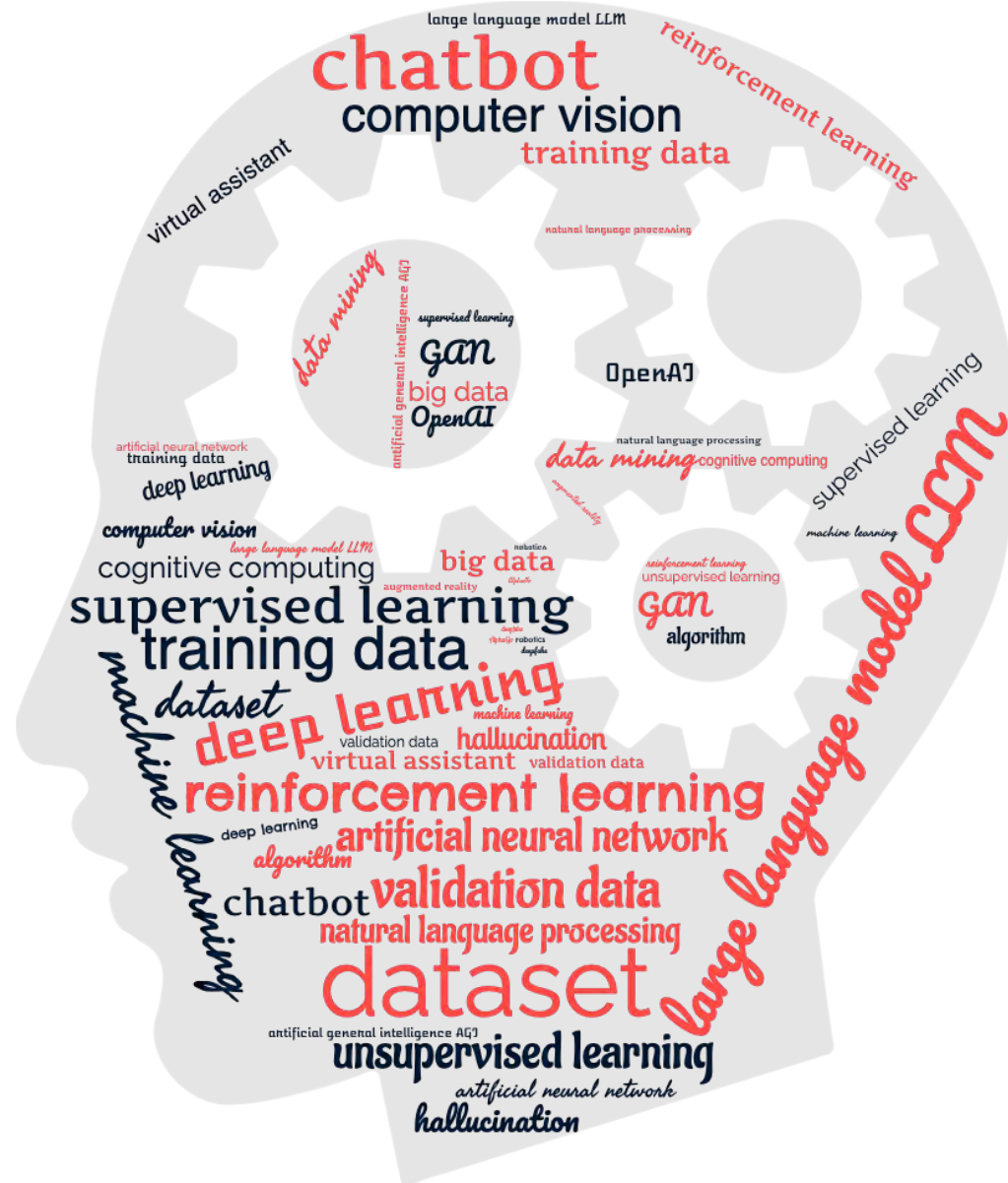
Customers like the quality, performance, and ease of use of the countertop griddle appliance. For example, they mention it makes great waffles, and produces perfectly cooked hash browns. That said, some appreciate the simple design and functionality.

AI-generated from the text of customer reviews

✓ Size ✓ Quality ✓ Performance

✓ Ease of use ✓ Cleaning ✓ Color

✓ Value Temperature



Generative Artificial Intelligence - GenAI

Machine Learning ->

Deep Learning ->

GenAI

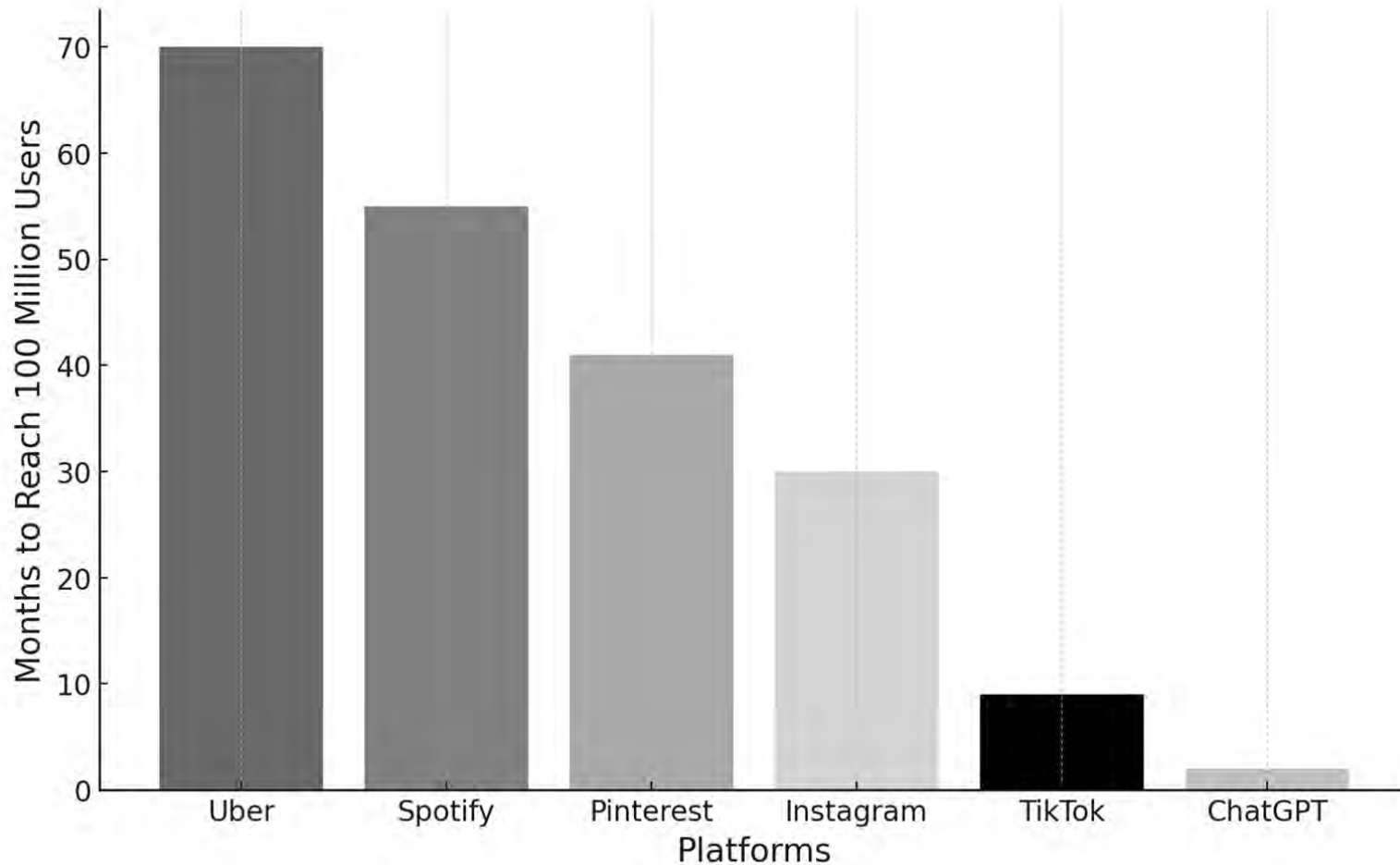
Create new, realistic outputs - text, images, video, music - based on learned patterns and data.

Growth of AI

1. Availability of **huge datasets**
2. Innovations in **chip technology**
3. Launch of free, accessible **GenAI chatbots**



Time to Reach 100 Million Users



AI + Healthcare: Data

- Electronic Health Records (EHRs)
- Genomic Data
- Imaging Data
- Clinical Trial Data
- Pharmacy Prescription Records
- Wearable Device Data
- Insurance Claims and Billing Data
- Public Health Data
- Biobank Data
- Social Determinants of Health Data

These massive and complex datasets provide the foundation for AI in healthcare.

AI + Healthcare

Physical Therapy + Audiology

An AI-powered system is being developed by researchers at Mayo Clinic to **triage dizzy patients** to the most appropriate specialists to save time and costs and to support best outcomes.

McCaslin, 2020

AI + Healthcare

Speech-language pathology

AI4ExceptionalEd: **AI for school SLPs**

- AI solutions to facilitate universal speech and language screenings when needed.
- AI productivity tools to streamline treatment planning, material selection and preparation.
- AI to help tailor SLP interventions to the individual needs of students.

AI + Healthcare

Behavioral Health

Cedars Sinai using virtual reality goggles plus an AI robot in Cognitive Behavioral Therapy to deliver directed contextual appropriate **AI expert psychotherapy.**

Spiegel, 2023

“The future of AI in mental healthcare is promising.”

Graham et al., 2019



AI + Healthcare

Medicine

Studies show promise in the use of **AI to help read mammograms**. A recent study concluded that using AI + one radiologist was superior at detecting cancer as compared to two experienced radiologists.

AI + Healthcare

And more...

- Allow earlier detection of disease
- Predict pandemics
- Drive drug discovery
- Enable more efficient clinical trial recruitment
- Optimize supply chain issues
- Clinical decision support tools

AI is poised to make healthcare more accurate, accessible and affordable.



AI + You

*“...the most sophisticated thing in the clinical workflow is the **human brain.**”*



Welch, 2023

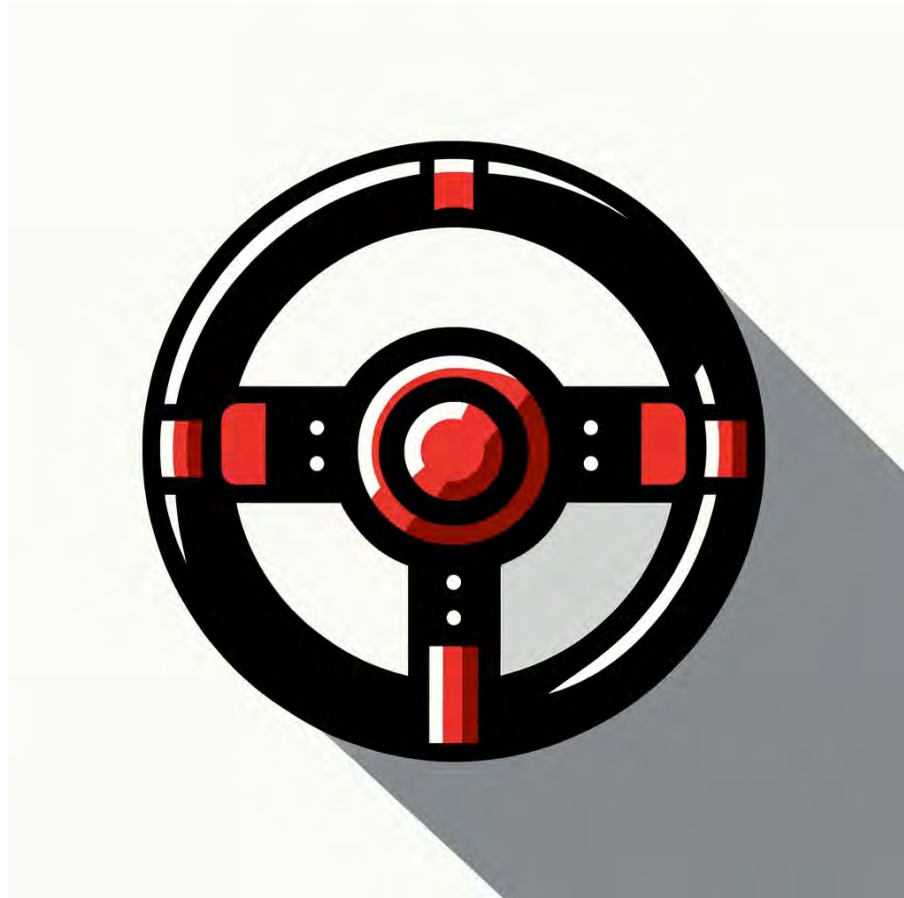
AI is ~~Coming~~ Here

Healthcare professionals must take an **active role** in the development and implementation of AI in healthcare.

By lending our clinical expertise and collaborating with experts from other disciplines, we can help **steer AI for healthcare** in a way that is ethical and impactful for our profession and our patients.



Let's Drive!



GenAI

“Using AI will teach you how to use AI.”

-Ethan Mollick

Mollick, 2023

What is Generative AI?

- Uses (human) inputs and creates something entirely new
- Leverages LLMs to identify patterns to create and convey ideas using prediction
- High quality text, images, and audio
- Chatbots



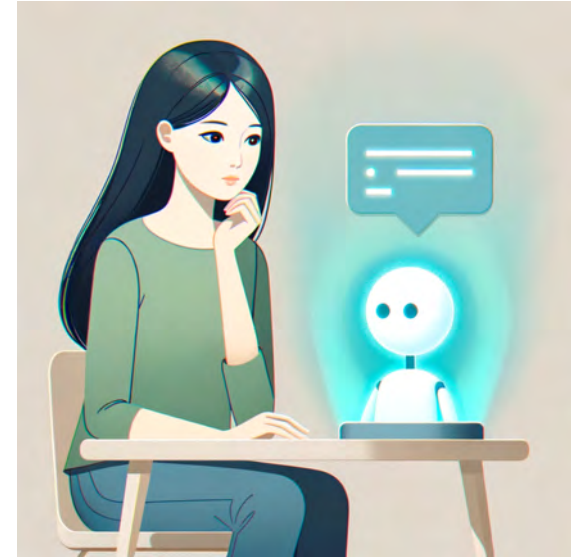
A Large Language Model...

- is a complex mathematical system that can learn skills by analyzing vast amounts of data, including digital books, Wikipedia articles and online bulletin boards.
- identifies patterns in all that text, and LLM learns to generate text on its own.
- can write term papers, generate computer code and even carry on a conversation.



GenAI can....

- Generate
- Simplify
- Explain
- Synthesize
- *Hallucinate*
 - When an AI system generates content that does not accurately reflect reality.



Hallucination Examples

- “I'm taking a Japanese class and I find it constantly hallucinates about grammar. It will be completely wrong but sounds so confident.”
- “ChatGPT cited MANY legal cases against a competitor complete with docket numbers and active judge assignments. They looked legit initially but I was unable to verify the cases and confirmed they were complete hallucinations. It made me think the AI wanted so badly to come up with an answer and please me it made it up!”
- “I asked for 10 scholarly references when writing a blog post on learning and every.single.one. was bogus.”

IRL: Image Generation Attempt #6



You

You are wrong, ChatGPT. Why are you showing me so many extra steps when there are only 5?



DALL-E

I apologize for the confusion and for not meeting your expectations with the previous image generations. Let's try again to create an image that accurately depicts the five specific stages of the Generative AI process you've outlined: Data Collection, Model Design, Pattern Finding, Specialized Training, and Generation. I will ensure the illustration only includes these five steps.



Here are the images that accurately depict the five stages of the Generative AI process, each stage in its own distinct panel. These panels are designed to be easily understandable, especially for children.

Hallucination Rates

Model	Accuracy	Hallucination Rate
GPT 4	97.0 %	3.0 %
GPT 3.5	96.5 %	3.5 %
Llama 2 70B	94.9 %	5.1 %
Llama 2 7B	94.4 %	5.6 %
Llama 2 13B	94.1 %	5.9 %
Cohere-Chat	92.5 %	7.5 %
Cohere	91.5 %	8.5 %
Anthropic Claude 2	91.5 %	8.5 %
Mistral 7B	90.6 %	9.4 %
Google Palm	87.9 %	12.1 %
Google Palm-Chat	72.8 %	27.2 %

GenAI cannot....

- Understand abstract concepts
- Reason about ethics and morals
- Perform original research
- Provide lived experience
- Fact check
- Ensure quality
- **Gen AI is language tool, not a knowledge tool.**
- **In sum, critical thinking is a human process.**

GenAI for Professionals

- Resume/CVs
- Cover letters
- Insurance company communication
- Letters of recommendation
- Performance reviews
- Graduate school application essays
- Job postings

GenAI for Business

- Patient handouts
- In-service/professional development learning experiences
- Community events
- Image creation
- Customer service chatbots
- Marketing

Summary: Chatbots enhance productivity, efficiency and quality for knowledge workers.

(Dell 'Acqua et al., 2023)

GenAI and your Clients

- They are using chatbots, too!
- Disinformation, misinformation, and patient education



GenAI and your Clients

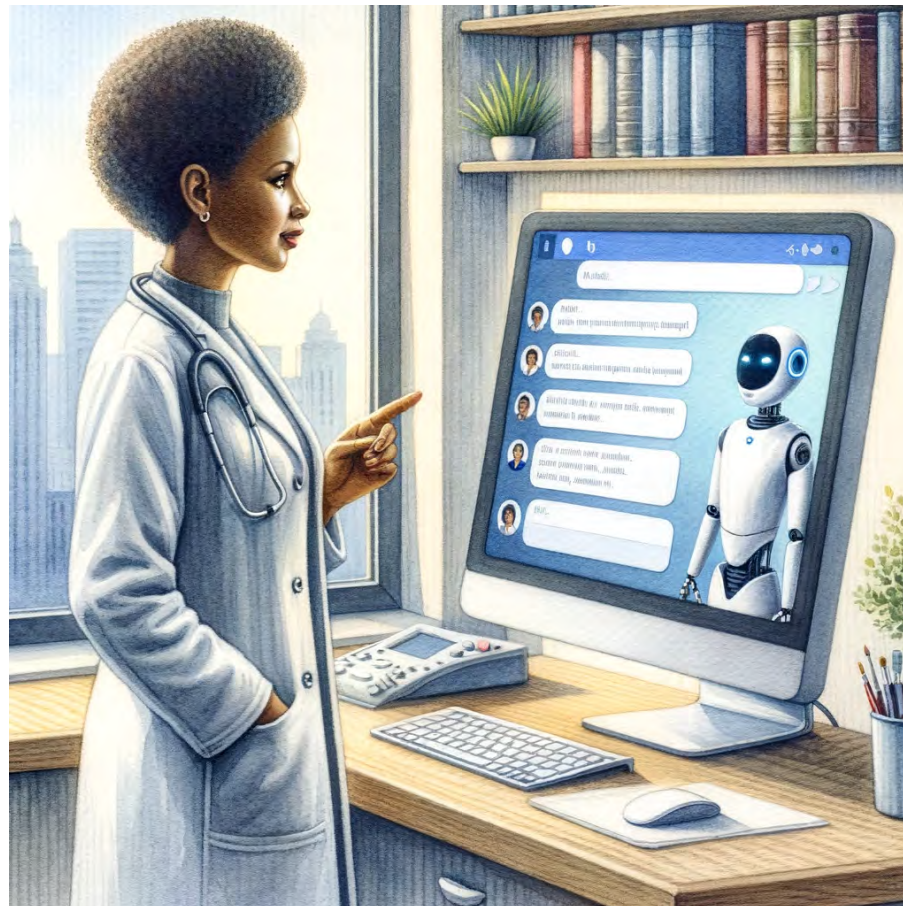
“The spread of misinformation and disinformation has affected our ability to improve public health, address climate change, maintain a stable democracy, and more. By providing valuable insight into how and why we are likely to believe misinformation and disinformation, psychological science can inform how we protect ourselves against its ill effects.”

(American Psychological Association, 2023, para. 2)



GenAI and You

Let's chat, shall we?



Prompting 101: CREATE

Character

- The clear role the LLM should play

Request

- Specify the task

Examples

- Provide relevant examples

Additions

- Adjust the prompt to shape results

Type of Output

- Specify the desired type of output

Extras

- Conversational add-ons

CREATE Example

I'm a seasoned clinical occupational therapist who supervises and mentors students considering OT as a profession. I'm often asked to write letters of recommendation for students applying to OTD graduate programs. Please write a 4-5 paragraph letter of recommendation for Monica Geller, who is applying to the NYU OTD program. Examples of Monica's strengths include empathy for others, strong academic performance, excellent critical thinking, and clear communication with patients and colleagues. The output should not exceed one page.



Response
Time:
11.18 sec

Here is a draft letter of recommendation for Monica Geller applying to the NYU OTD program:

To the Admissions Committee:

It is my pleasure to strongly recommend Monica Geller for admission to the Occupational Therapy Doctorate program at NYU. I have served as Ms. Geller's clinical supervisor for the past year while she has completed her fieldwork rotations in occupational therapy. In working closely with her, I have found Monica to possess an impressive range of skills and personal qualities that will serve her exceptionally well as a future occupational therapist.

Most notably, Monica stands out for her empathy and compassion when working with patients from diverse backgrounds and abilities. Her kind demeanor puts patients at ease while still maintaining utmost professionalism. Monica is able to connect with patients and gain their trust because they sense her genuine care and concern for their wellbeing. These interpersonal abilities create an ideal foundation for developing treatment plans tailored to each individual's needs.

Additionally, Monica has proven herself to be an engaged student eager to expand her skills and OT knowledge base. She takes initiative in her learning, always coming to the clinical site prepared with insightful questions that reflect her dedication to evidence-based best practices. Monica also works well independently; she knows when to ask for guidance and when to forge ahead applying what she has learned to solve problems with creativity and resourcefulness.

Monica is adept at thinking critically through treatment challenges while keeping the patient's best interests at heart. Her analytical capabilities and sound judgment give me great confidence in her abilities to handle complex situations that may arise. When providing recommendations during rounds or team meetings, Monica backs up her ideas with logic and facts, demonstrating maturity beyond her years.

In closing, Monica possesses the full suite of capabilities - outstanding intellect, clinical acumen, moral character, and passion for helping others - that will empower her success in graduate school and an occupational therapy career. I give Monica my strongest recommendation for the NYU OTD program. Please contact me if you would like any further information on this exceptional candidate.

Sincerely,

[Your Name]

[Contact Info]

Chatbot	Type	Description
Bard	Language	A language-based AI that assists in generating creative content like poetry, stories, and more.
Bing	Language/Image	Primarily a search engine, but it also uses natural language processing for language-based searches and provides image search results.
ChatGPT	Language	A natural language processing model for text-based conversations. It generates human-like text responses.
Character.ai	Language	A language model designed to create dialogue and character-driven narratives for storytelling and content generation.
Claude	Language	A chatbot that uses natural language processing for text-based interactions and conversations.
DALL-E	Image	A generative model that creates images from textual descriptions, enabling the generation of visual content based on text input.
Midjourney	Video	A video tool that uses AI to assist in video editing and creation by automating certain tasks, making it a video-related tool.
Synthesia	Video	A video tool that uses AI to create synthetic videos using a text-to-video approach.

Prompting or Conversation?

- Prompting with a model (CREATE) is excellent practice.
- Prompting is focused on a specific goal/use case
- Conversation is a more natural, dynamic Q&A to focus the output
- Conversation can create unexpected, useful results
- **Both are effective**

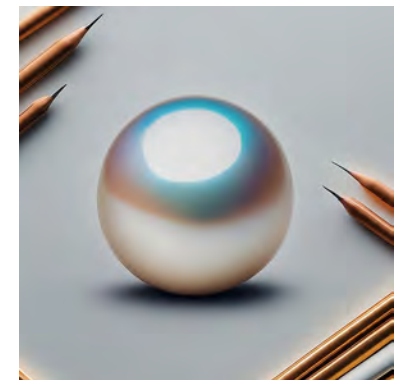
Conversation Rules of Engagement

1. Be clear and concise
2. Ask one question at a time
3. Be patient
4. Use a natural tone
5. Provide context
6. Avoid inappropriate questions
7. Be willing to rephrase
8. Say thanks



ChatBot Pearls of Wisdom

- The 80% rule
- Check for accuracy
- Rephrase, don't repeat
- Provide feedback!
- Know the knowledge cutoff
- Input and output length limitations
- “Using AI will teach you how to use AI”

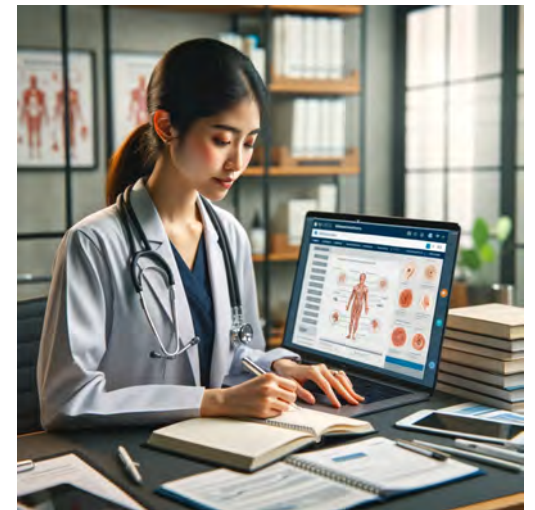


Pause and Play - Choose a Chatbot!

- Resume/CV
- Cover letter
- Insurance company communication
- Letter of recommendation
- Performance review
- Graduate school application essay
- Job posting
- Patient newsletters
- Patient handout
- Peer-to-Peer learning experience
- Community event
- Image creation
- Customer service chatbot

Pause and Play - Reflection

- What information did you discover was missing from your prompt?
- How did you adjust the prompt to improve the output?
- What surprised you about the ChatBot experience?



Risks/Limitations

1. Misinformation/Disinformation
2. Privacy
3. Copyright
4. Bias



Risks/Limitations

Misinformation + Disinformation

- Hallucinations
- Deceptive info and deepfakes
- Data transparency

See Menz et al., 2023

See [Diep Nep, YouTube](#)

Risks/Limitations

Privacy

- AI systems use and store vast amounts of personal data
- Security/data breaches
- Accountability





“If you include personal data in your Prompts, we will collect that information and this information may be reproduced in the Outputs.”

Source: <https://console.anthropic.com/legal/privacy> version 3.0

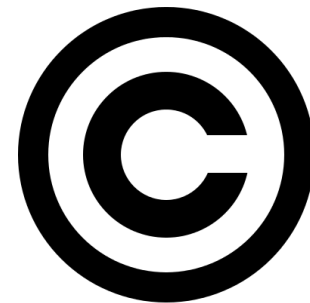
See also Carlini et al., 2019



Risks/Limitations

Copyright

- AI may have been trained on datasets with copyrighted works without permission or remuneration
- AI outputs may contain original aspects of its training data



Risks/Limitations

Bias

- **Data bias:** Data may not be inclusive (e.g. reflect wider societal biases and inequality)
- **Algorithm bias:** May overcorrect or undercorrect for outliers in datasets
- **Decision bias:** How we understand, interpret and use statistical data

See Li et al., 2023

Strategies for Safe GenAI

Regulation / Guidelines

1. International

e.g. UN AI Advisory Body, EU AI Act

1. National

e.g. US Executive Order

1. Industry / Professional Guidelines*

2. Company*

Strategies for Safe GenAI

Verify & Fact Check

- Always verify/fact check GenAI results
- YOU are responsible for how you use AI

“AI makes predictions; humans make decisions.”

-Werner Vogels



“...You should not rely on any Outputs without independently confirming their accuracy. Outputs may contain material inaccuracies even if they appear accurate...”



ChatGPT 4 ▾



How can I help you today?



Send a message



One-click prompts



Web access



ChatGPT can make mistakes. Consider checking important information.

Bard

A conversational AI tool
by Google


Things to know

- Bard uses your location and your past conversations to provide you with its best answer.
- Bard is an experimental technology and may sometimes give inaccurate or inappropriate information that doesn't represent Google's views.
- Don't rely on Bard's responses as medical, legal, financial, or other professional advice.
- Your [feedback](#) will help make Bard better.

Source: Bard/Google terms of service 12/7/23

Strategies for Safe GenAI

Privacy / Copyright

- Input: Use with caution, especially with PHI or personal information
 - Output: Use the information with caution (personal use v. public use)
 - Terms of use / opt outs
- 

Bard

A conversational AI tool
by Google

*To help with quality and improve our products (such as generative machine-learning models that power Bard), human reviewers read, annotate, and process your Bard conversations. We take steps to protect your privacy as part of this process. This includes disconnecting your conversations with Bard from your Google Account before reviewers see or annotate them. **Please don't enter confidential information in your Bard conversations** or any data you wouldn't want a reviewer to see or Google to use to improve our products, services, and machine-learning technologies.*

See also:

Google Privacy & Terms: Information Google Collects

<https://policies.google.com/privacy#infocollect>

Strategies for Safe GenAI

Policies


1. Establish a policy for use of AI in your workplace
2. Advocate for your professional organization to educate, inform and regulate AI in your field

Guidelines Example - APA

AI should:

1. Be human-centric
2. Elevate ethics & diversity
3. Be well-researched
4. Be effective & risk avoidant
5. Prioritize privacy
6. Be transparently deployed

Source: <https://www.apaservices.org/advocacy/artificial-intelligence-factsheet.pdf>



Summary: SAFE AI

Security: Guard personal data and PHI.

Awareness: Be transparent and align with workplace rules.

Fact Check: Identify AI biases and always verify accuracy of outputs.

Education: Continuously learn about AI advancements.

Accountability: Adhere to copyright and AI laws.

Integrity: YOU are responsible for how you use GenAI.



References & Resources

For the full reference list and our top-recommended resources on AI, please refer to the course handouts.

Thank you!

