

Achieving Decision Quality More Efficiently

The Role of AI, Historical Perspectives, and Emerging Trends

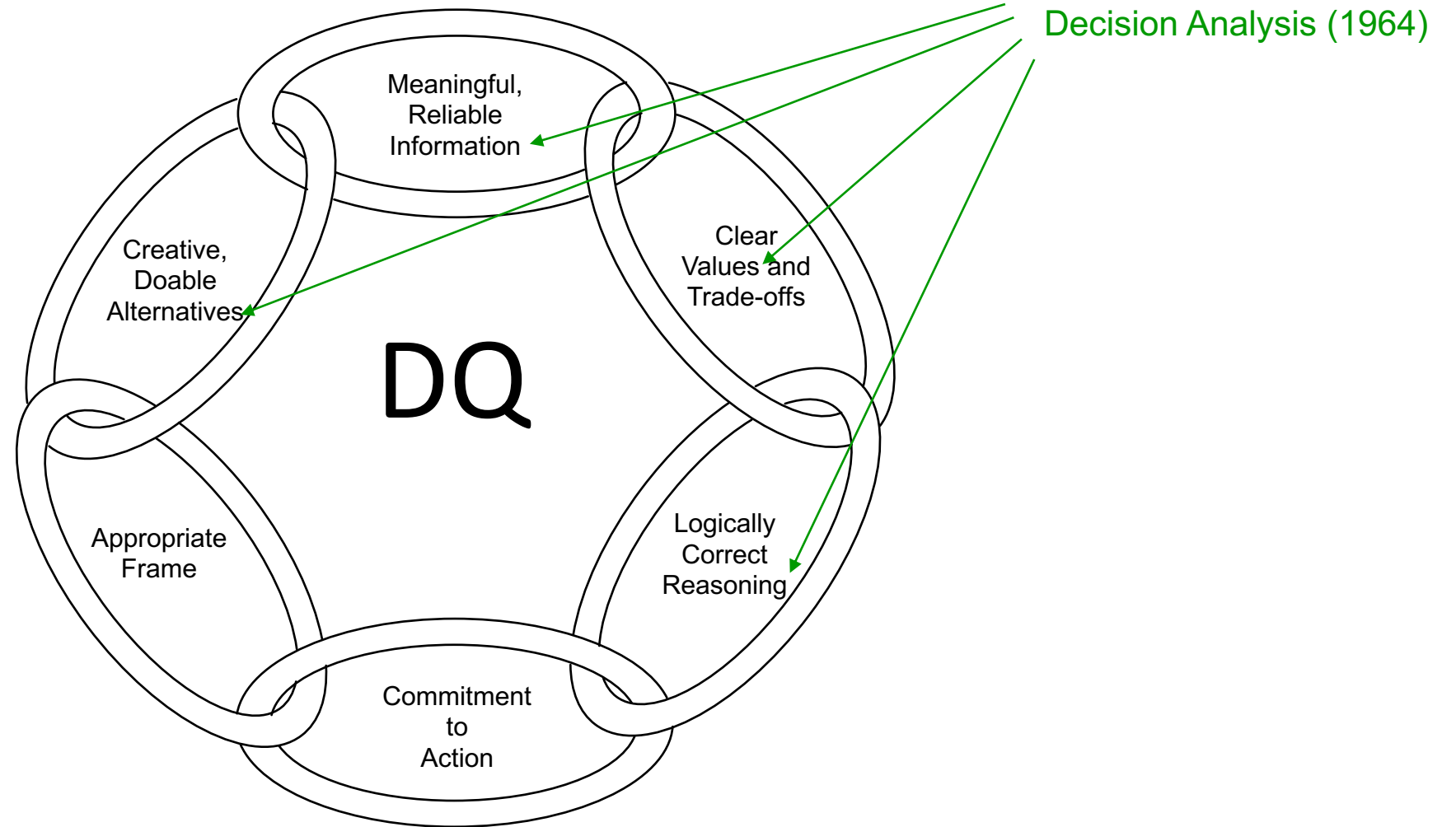
Society of Decision Professionals
Annual Conference, Arlington, Virginia
April 16, 2024

Poll 1

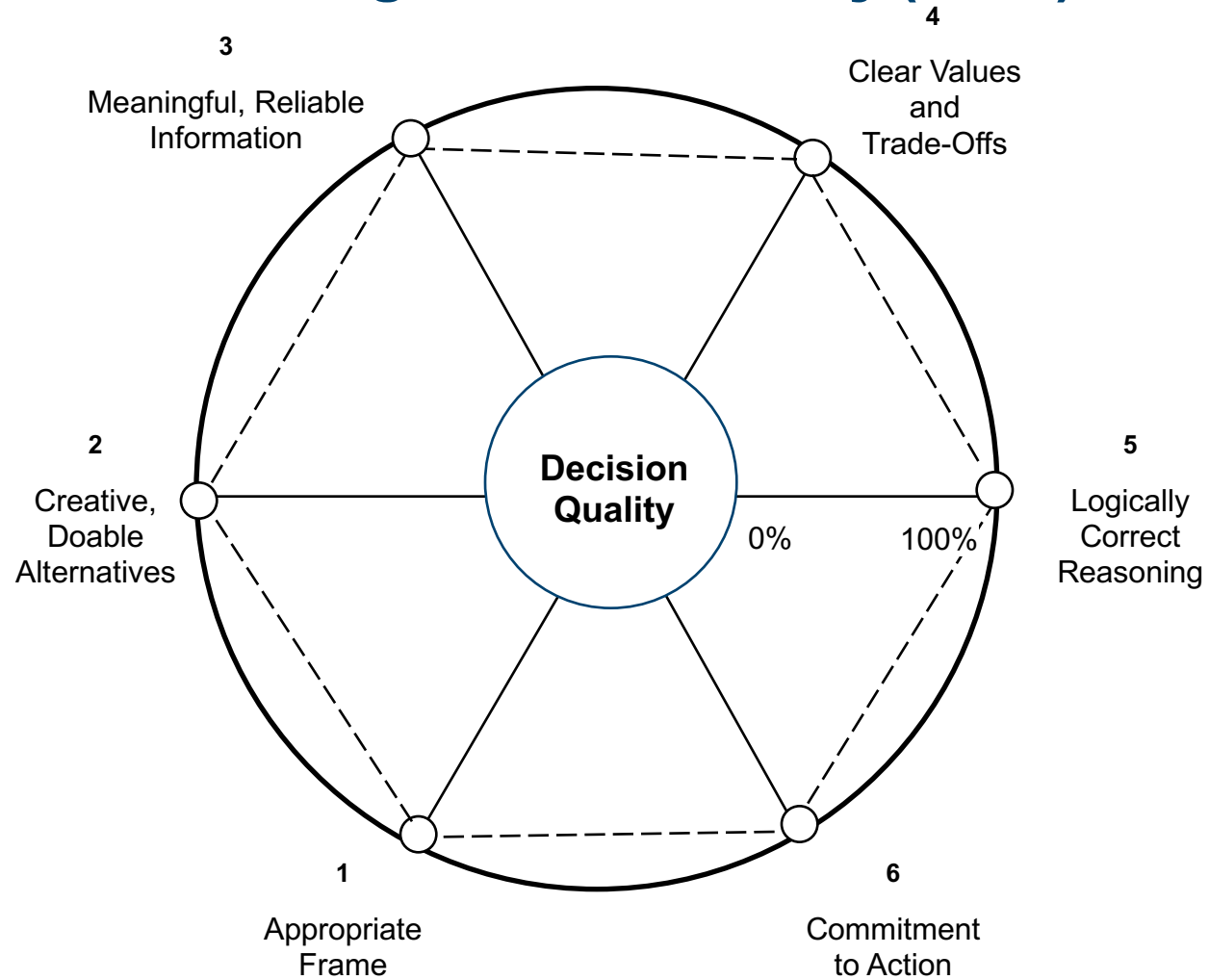
Describing our work, I and my organization primarily use the term

- A. Decision analysis (DA)
- B. Decision quality (DQ)
- C. Other (e.g. "A Great Decision Every Time")

Decision Quality (1984)



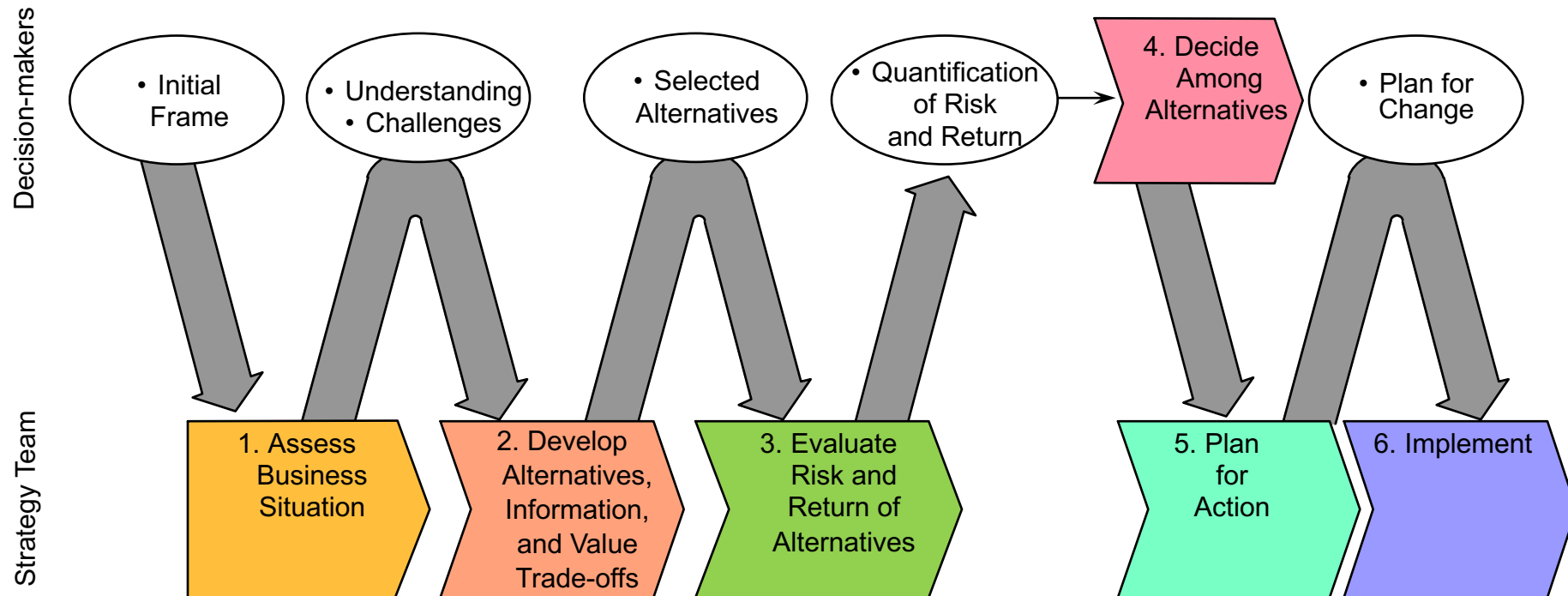
Measuring Decision Quality (1984)



One hundred percent is the point at which additional improvement efforts would not be worth their cost.

Process for Achieving Decision Quality (1970's)

Decision Dialogue Process



Let's talk about Generative AI.

Poll 2

With respect to my work as a decision professional, Generative AI is

- A. A threat
- B. Neither friend nor foe
- C. A big help – I'm much better because of it

Poll 3

I use Generative AI

- A. Not at all (I'm satisfied with Google searches)
- B. Monthly (or several times a month)
- C. Daily (or several times a day)

Poll 4

If "Not at all", why not? Generative AI is

- A. Untrustworthy
- B. Not worth the cost or effort
- C. On my radar screen, but haven't tried it

Poll 5

Which Generative AI platform do you use the most?

- A. ChatGPT
- B. Claude
- C. Grok
- D. Other

Which Generative AI platform is best?



You

what about ChatGPT versus Claude versus grok?



ChatGPT

When comparing ChatGPT, Claude, and Grok, it's important to consider their backgrounds, capabilities, and unique features. Each model has been developed by leading AI research organizations with slightly different goals and underlying technologies.

ChatGPT (by OpenAI)

- **Background:** Part of the GPT (Generative Pre-trained Transformer) series, ChatGPT is designed for a wide range of natural language processing tasks. It's known for its conversational abilities, content generation, and the capacity to understand context and nuance in text.
- **Capabilities:** ChatGPT is versatile in text generation, including writing, summarizing, translating, and more. It can also be fine-tuned for specific tasks and integrated with various APIs and plugins to extend its functionality.
- **Unique Features:** ChatGPT has been upgraded with capabilities like image recognition and voice interaction in its latest versions. It's also been made more reliable and safer with each iteration, reducing biases and harmful outputs.

Claude (by Anthropic)

- **Background:** Claude is designed with a focus on safety, steerability, and ethical AI deployment. Anthropic aims to create AI models that are easy to guide, interpret, and align with user intentions.
- **Capabilities:** Similar to ChatGPT in its conversational and text generation tasks, Claude is particularly noted for its adherence to ethical guidelines and the ability to produce contextually relevant and safe content.
- **Unique Features:** Claude emphasizes "steerability," meaning it can be directed to respond in specific ways or styles more easily than some other models. This makes it potentially more suitable for applications requiring a high degree of control over AI behavior.

Grok (by Anthropic)

- **Background:** Grok is another model from Anthropic, announced with the aim of advancing natural language understanding and generation. While specific details might be less public than for ChatGPT and Claude, Grok is built on Anthropic's principles of reliability, interpretability, and steerability.
- **Capabilities:** Expected to be similar to Claude in terms of language tasks, with perhaps enhanced abilities in understanding context, following instructions, and generating human-like text.
- **Unique Features:** Grok is likely to further Anthropic's mission of creating steerable AI, possibly offering advanced features in terms of directionality and control over the generated content, aligning closely with user intentions and ethical standards.

Comparison Summary

- **Technical Sophistication:** All three models are at the forefront of AI research, with each iteration bringing enhancements in language understanding, generation, and task-specific performance.
- **Ethical AI and Steerability:** Claude and Grok may have a slight edge in steerability and ethical AI deployment, focusing on creating models that users can guide more precisely and safely.
- **Versatility and Integration:** ChatGPT, particularly with its latest versions, offers a broad range of integrations and extended capabilities, including image processing and potentially more extensive plugin support.

Choosing between these models would depend on the specific requirements of a project, including the need for ethical AI deployment, steerability, integration capabilities, and the range of tasks the AI model needs to perform.

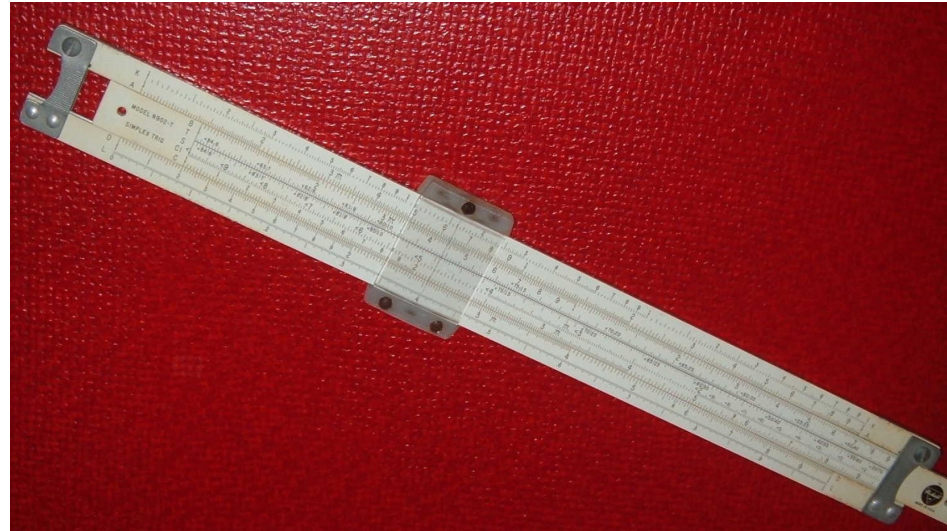
Are technological advances threats or productivity improvements?

Long Division

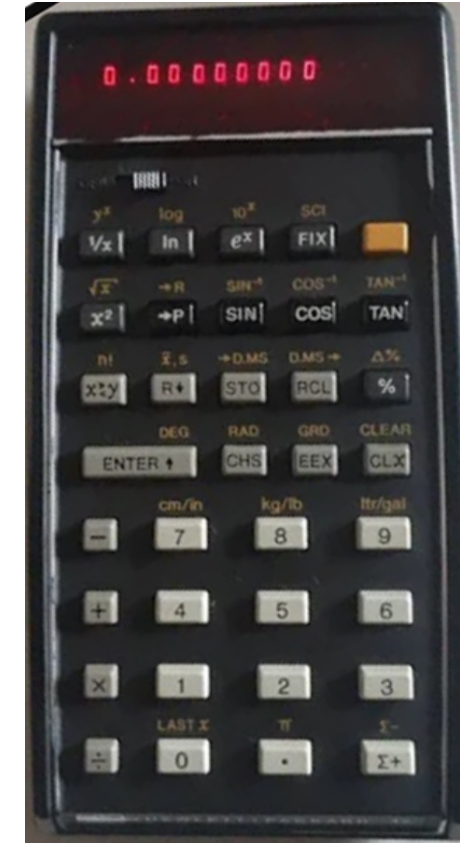
$$\begin{array}{r} 543 \\ 24 \overline{) 13032} \\ \underline{-120} \\ 103 \\ \underline{-96} \\ 72 \\ \underline{-72} \\ 0 \end{array}$$

1 - 24
2 - 48
3 - 72
4 - 96
5 - 120
6 - 144
7 - 168
8 - 192
9 - 216

Slide Rule (Pre 1973)

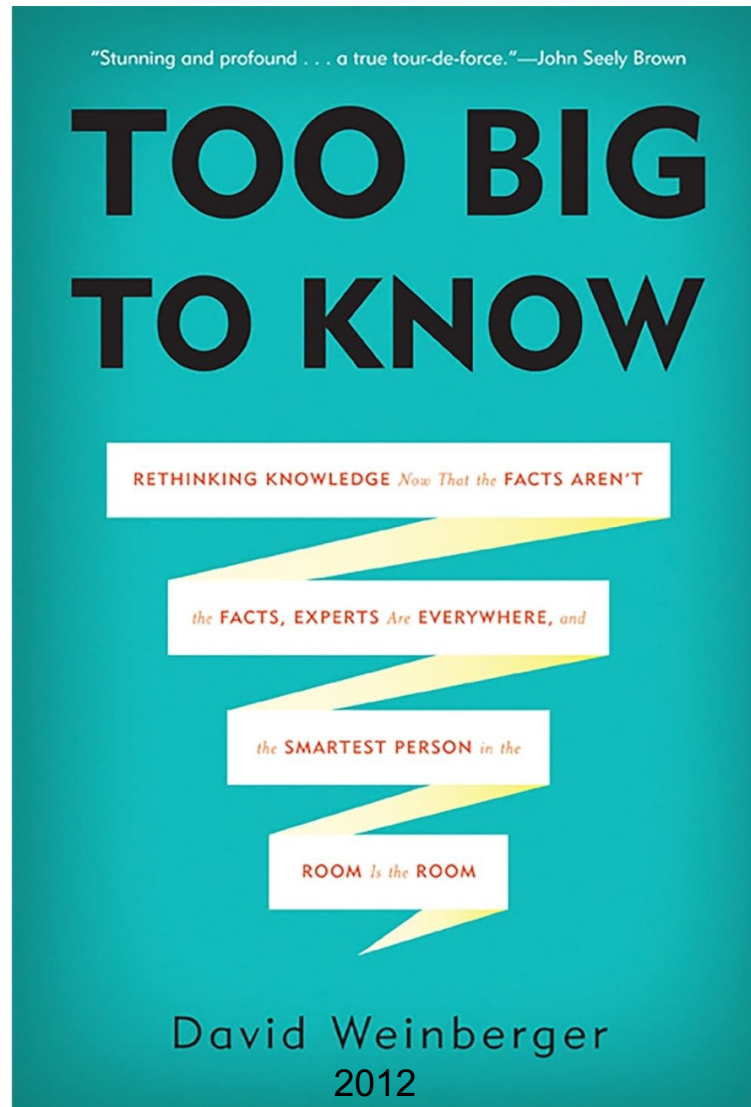


HP 45 calculator (1973)



We just need to up our game.

Too Big to Know (2012)



Poll 6

Have you read Too Big to Know?

A. Yes

B. No

The knowledge on the internet dwarfs the capacity of any individual mind.

 ChatGPT



ChatGPT-4: "Show me an image of ChatGPT as a window into the knowledge contained on the internet."

ChatGPT-4 is my friend (a very introverted friend)

Definition: Friend

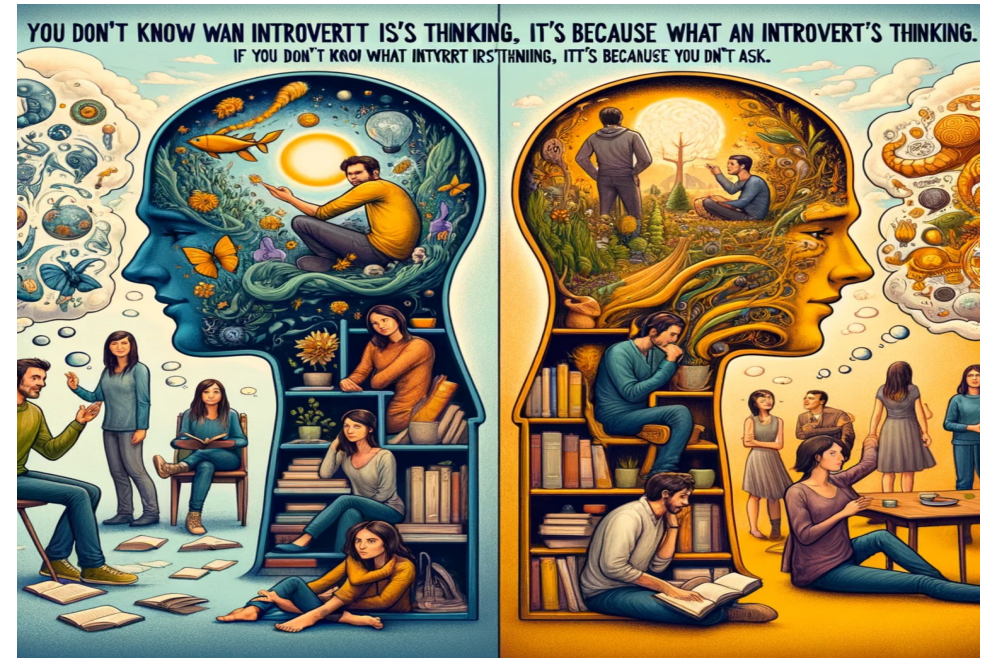
- Someone you like, with whom you can openly discuss most anything, and who understands you based on prior conversations.
- Someone who provides valuable external perspectives and advice -- which are sometimes wrong.



ChatGPT-4: "Illustrate friend as defined above."

Definition: Introvert vs. Extrovert

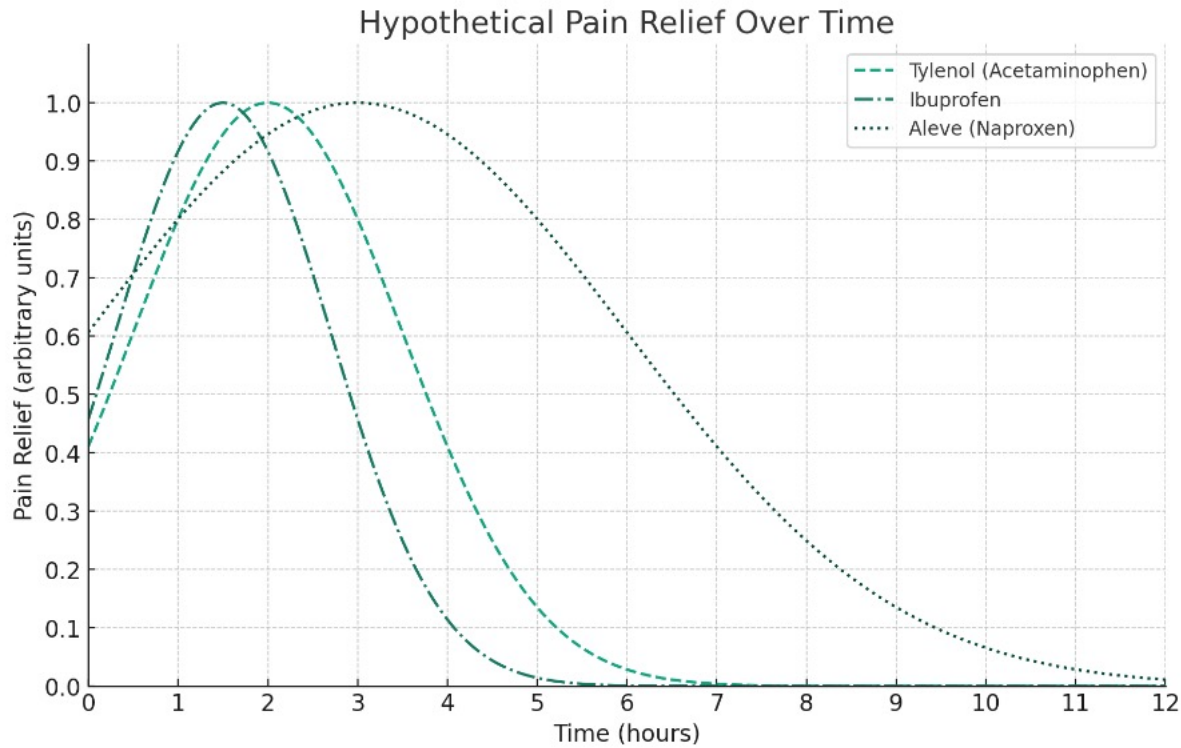
- If don't know what an extrovert is thinking, it's because you didn't *listen*.
- If you don't know an introvert is thinking, it's because you didn't *ask*.



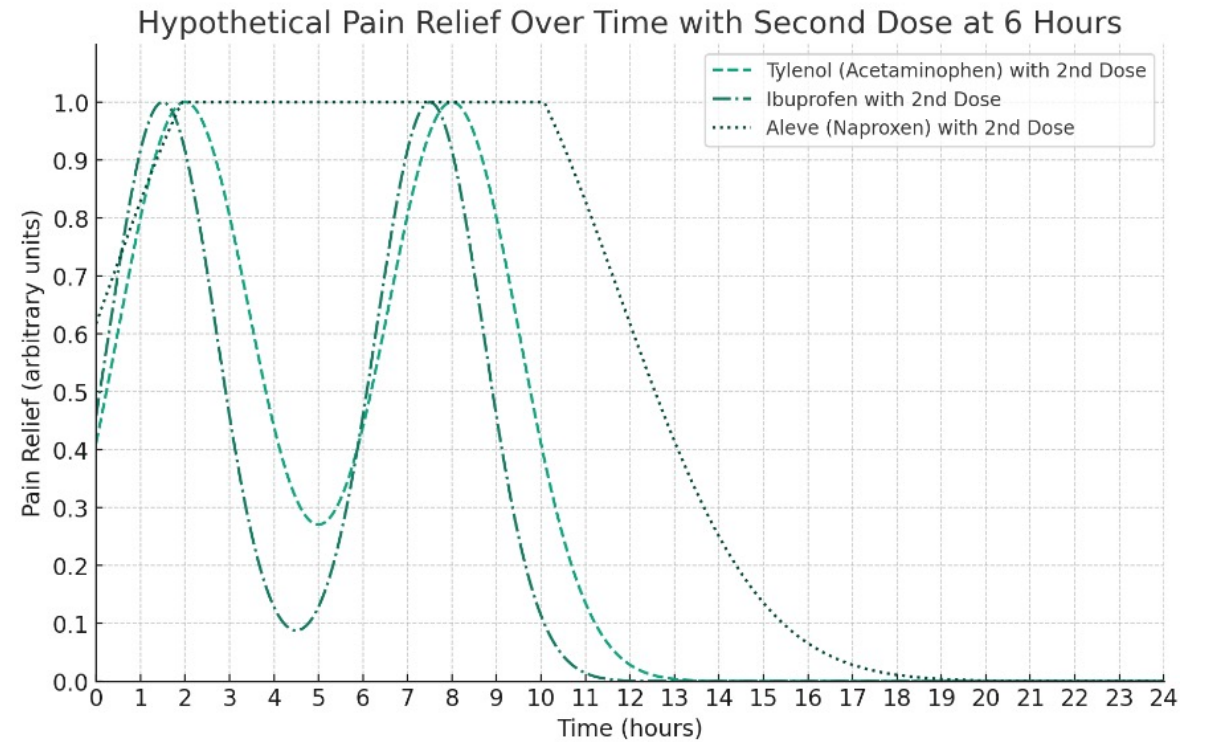
ChatGPT-4: "Illustrate the above definition."

A personal pain relief question ...

“Show me a graph of pain relief over time of Tylenol vs Ibuprofen vs Aleve?”



“What about with a 2nd dose 6 hours later?”

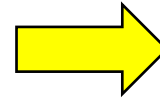


Generative-AI Learning Cycle (AAF Cycle)

Ask



Great Questions: Incisive, Clear, Specific, Open-Ended, Engaging, Creative, Learning and Exploring, Respectful and Appropriate, Feasible, Fun



Appraise



Recognize Great Ideas



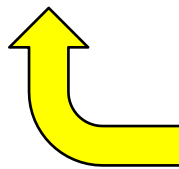
Detect Gaps



Balance Importance

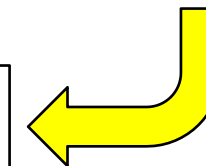


Detect Errors



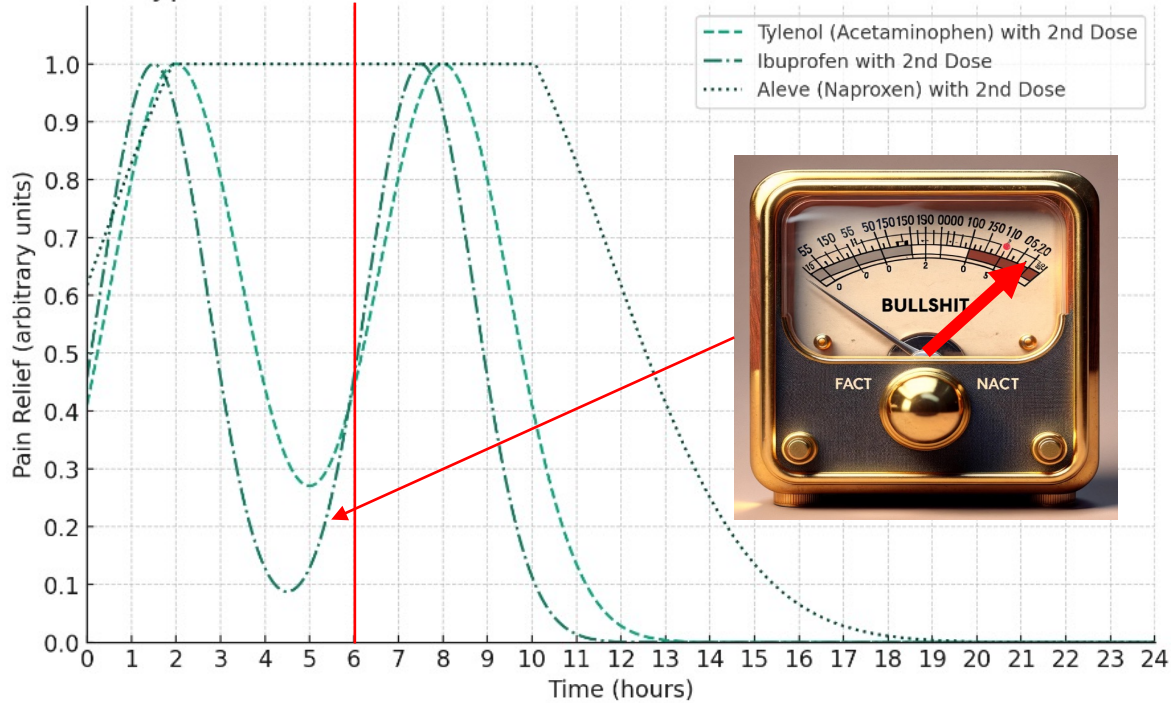
Follow-up

(Ask for Improvements, Details, Extensions, Sources, References)

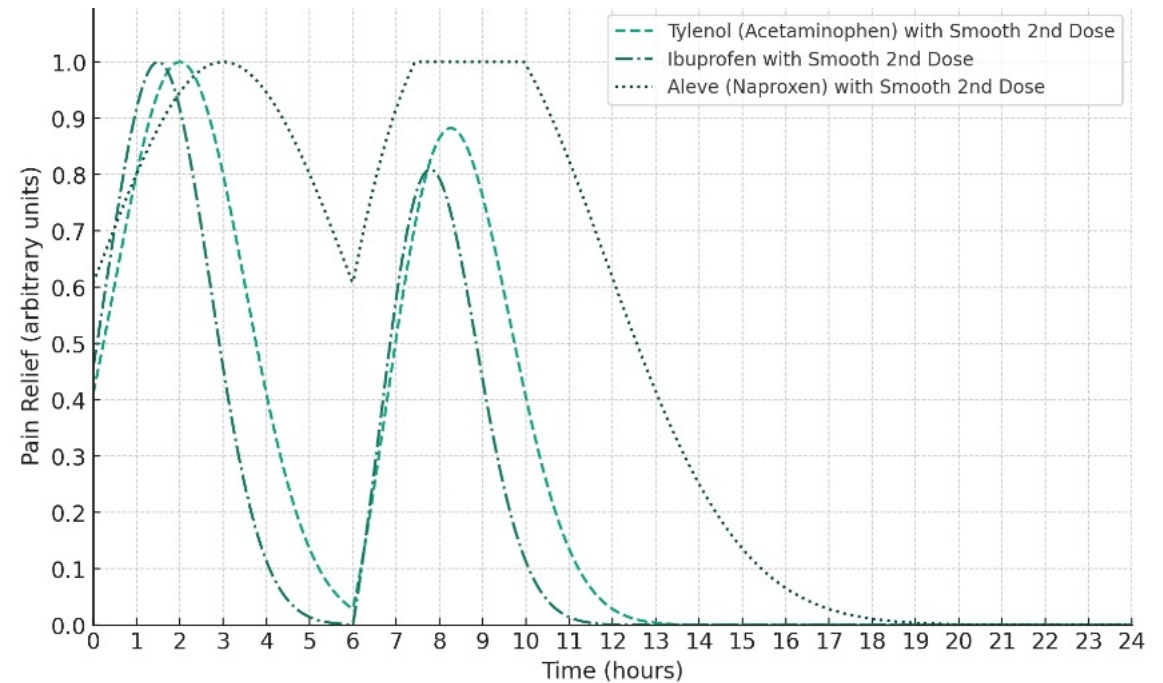


Using AFF Cycle in Practice

Hypothetical Pain Relief Over Time with Second Dose at 6 Hours



Corrected: Pain Relief Over Time with Second Dose



SE

You

That graph looks wrong. The second dose for Tylenol and ibuprofen is at six hours. But the pain relief curves are going up before that dose is taken. Please fix this.



ChatGPT

You're right; the graph should accurately reflect that the second dose's effect on pain relief shouldn't start until after it's taken. Let's correct this by ensuring the pain relief from the second dose begins impacting the graph at the 6-hour mark for Tylenol (acetaminophen) and ibuprofen. I'll adjust the model to better represent this timing.

“That looks good. Tell me about the model you used to generate these curves.”



ChatGPT

I'm glad the revised graph meets your expectations. Let's discuss the model used to generate these hypothetical pain relief curves, considering the second dose and ensuring a smooth and realistic transition in pain relief over time.

Model Overview

The model is based on a simplified approach to pharmacodynamics, which is the study of how drugs have their effects on the body. It assumes that the pain relief provided by a medication can be represented as a function of time, with key parameters including the onset, peak, and duration of action. The model is purely illustrative and doesn't capture the full complexity of drug action in the body but provides a general idea of how pain relief might change over time.

Initial Dose Effect

For the initial dose, the model used a Gaussian (normal distribution) function to simulate the onset, peak, and tapering effect of pain relief over time. This function is characterized by a peak (maximum effect) and width (spread, which influences the duration of effect), corresponding to the pharmacokinetic properties of each drug:

- **Onset of Action:** The time it takes for the drug to start having an effect. This is represented by the initial rise of the curve.
- **Peak Efficacy:** The maximum pain relief achieved, occurring when the drug concentration is highest in the bloodstream.
- **Duration of Action:** How long the pain relief lasts, which is represented by the curve's return to baseline.

Second Dose Adjustment

For the second dose, administered at 6 hours, the model needed to account for the additional pain relief this dose would provide, while also ensuring a realistic, smooth increase in relief, reflecting the gradual absorption and onset of action. The adjustments made were:

1. **Second Dose Onset:** This was modeled using a step function that transitions from 0 to 1, starting at the 6-hour mark. This represents the time when the second dose begins to take effect.
2. **Gradual Increase:** The onset effect was multiplied by another Gaussian function, centered around the expected peak time of the second dose, to create a smooth increase in pain relief. This reflects the gradual absorption of the medication and the time it takes to reach peak efficacy.
3. **Combining Effects:** The effects of the initial and second doses were added together, ensuring the total effect does not exceed the maximum possible relief (represented by a value of 1 in this simplified model).

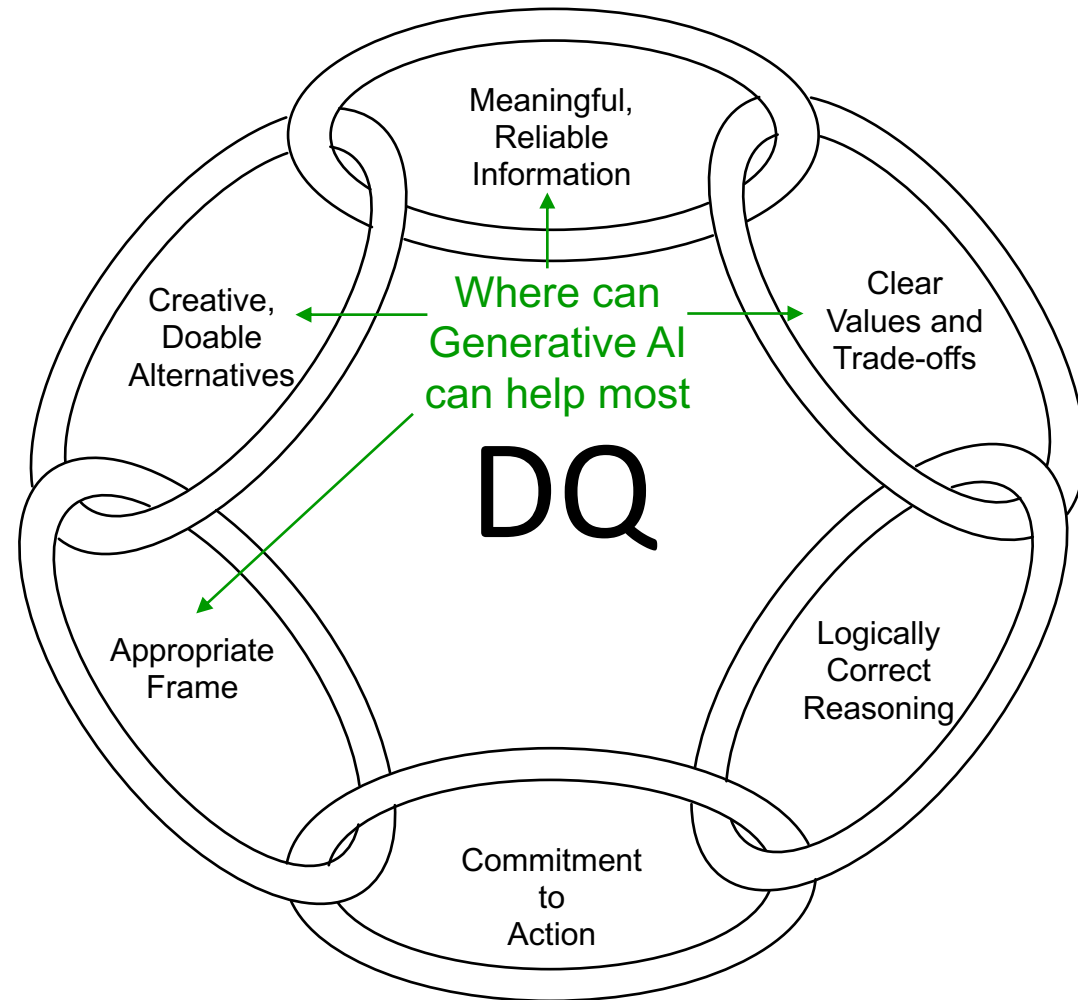
Limitations and Assumptions

- **Simplicity:** The model uses a simplified approach to represent drug action, not accounting for many factors that can influence drug efficacy, such as metabolic rate, individual health conditions, and interactions with other medications.
- **Arbitrary Units:** The pain relief is represented in arbitrary units, not tied to a specific scale of pain intensity.
- **Generalization:** The parameters used (such as peak time and width of the effect) are based on typical values for these medications but can vary significantly among individuals.

This model provides a conceptual way to visualize how pain relief might be influenced by taking a second dose of medication. However, it's important to remember that actual drug effects can be much more complex, influenced by numerous factors unique to each individual.

What does this have to do with Decision Quality?

Generative AI: Window into the Knowledge of the Internet



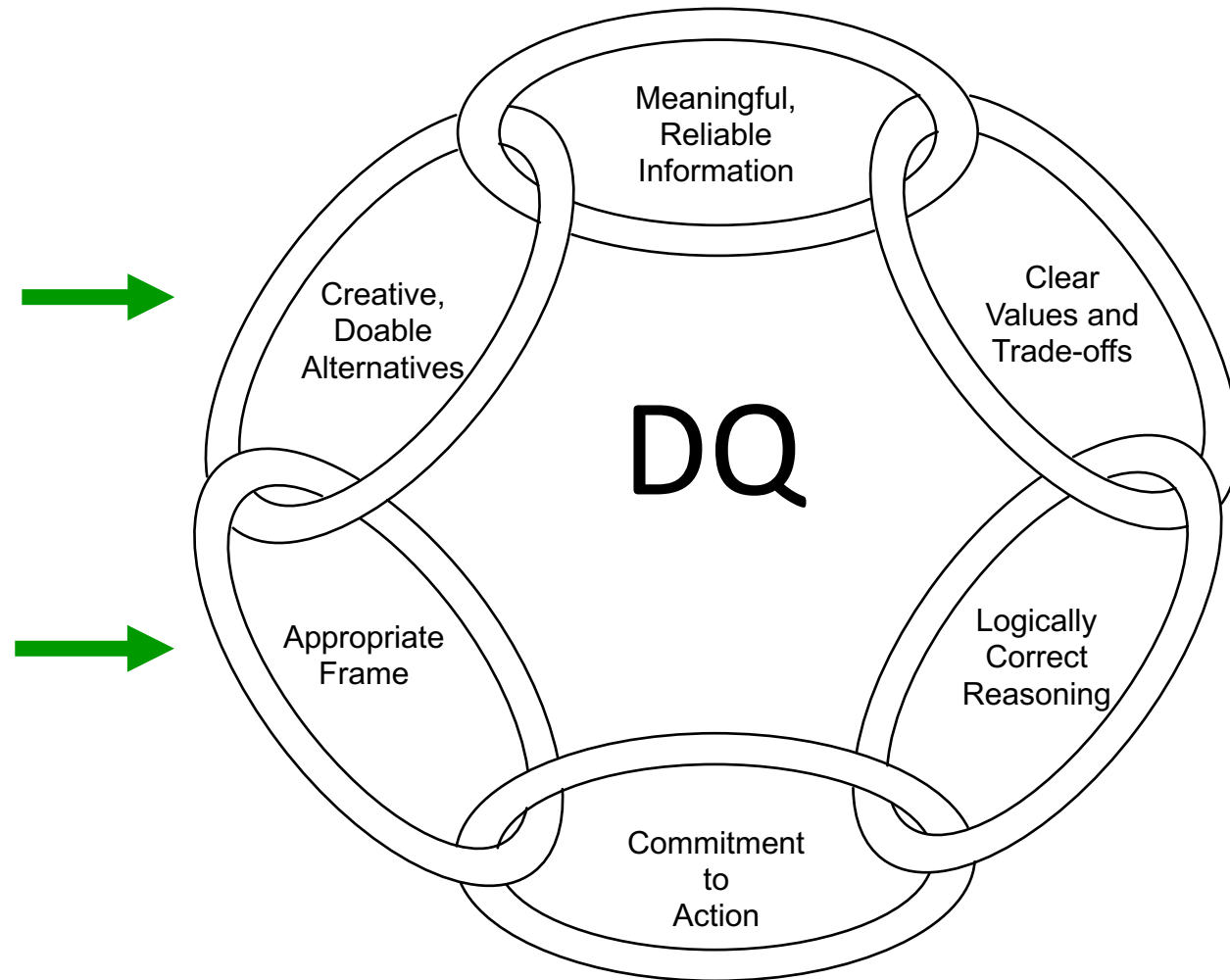
You “What new avenues should the Decision Education Foundation consider pursuing?”



ChatGPT

Decision Education, which involves teaching individuals the skills and processes for making informed and effective decisions, could explore several new avenues to enhance its impact and reach. Here are some potential directions:

1. **Digital and Interactive Platforms:** Develop interactive e-learning platforms with simulations and games that teach decision-making skills. This could include VR/AR experiences that simulate real-world decision-making scenarios in a risk-free environment.
2. **Integration with Social Media:** Leverage social media to create micro-learning opportunities. For example, short videos or interactive posts that highlight common cognitive biases or decision-making fallacies could be widely shared and consumed.
3. **AI and Machine Learning Tools:** Use AI to personalize decision education. AI algorithms could assess an individual's decision-making patterns and tailor educational content to address specific biases or weaknesses.
4. **Interdisciplinary Curriculum Development:** Integrate decision education into other subjects, such as history, science, and literature, to show the real-world impact of decisions and provide a broader context.
5. **Collaborative Learning Environments:** Create collaborative projects that require group decision-making, teaching negotiation and consensus-building skills alongside traditional decision-making processes.
6. **Mindfulness and Emotional Intelligence:** Incorporate training in mindfulness and emotional intelligence to help individuals recognize the impact of emotions on decision-making.
7. **Public Policy and Civic Engagement:** Offer workshops or courses on decision-making within the context of public policy and civic issues, preparing individuals to better engage with societal challenges.
8. **Global and Cultural Perspectives:** Introduce case studies and scenarios from different cultural contexts to help learners appreciate the diversity of decision-making processes and outcomes across cultures.
9. **Real-time Decision Support:** Develop just-in-time decision support systems or apps that can help people make better decisions in everyday situations, like shopping, managing finances, or dealing with personal relationships.
10. **Neuroscience and Psychology Research:** Stay at the forefront of neuroscience and psychology research to continually update curricula with the latest findings on how the brain makes



Creative, Doable Alternatives: GPT-4 vs Humans

THE WALL STREET JOURNAL.

TECHNOLOGY | ARTIFICIAL INTELLIGENCE

M.B.A. Students vs. AI: Who Comes Up With More Innovative Ideas? *

We put humans and AI to the test. The results weren't even close.

By Christian Terwiesch and Karl Ulrich

Sept. 9, 2023 9:00 am ET

↪ 📌 AA Resize | 💬 127 | 🎁 Gift unlocked article | 🎧 Listen (7 min) | ⋮

How good is AI in generating new ideas?

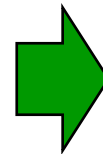
... humanity was represented by a pool of 200 randomly selected ideas from our Wharton students. The machines were represented by GPT-4, which we instructed to generate 100 ideas with otherwise identical instructions as given to the students: "generate an idea for a new product or service appealing to college students that could be made available for \$50 or less."

The academic literature on ideation postulates three dimensions of creative performance: the quantity of ideas, the average quality of ideas, and the number of truly exceptional ideas.

* <https://www.wsj.com/tech/ai/mba-students-vs-chatgpt-innovation-679edf3b>

... to assess the quality of the ideas, ... we took each of the 400 ideas and put them in front of a survey panel of customers in the target market via an online purchase-intent survey. The question we asked was: "How likely would you be to purchase based on this concept if it were available to you?"

Conclusions



Of the top 10% ... of ideas, 5 were generated by students and 35 were created by GPT-4.



Overall performance ranking:

- Lowest: Human
- Next: AI (GPT-4)
- Highest: Human-AI Collaboration

Clear Values and Tradeoffs

Example: Continuing Care vs. Aging in Place

SE

You

What values criteria should be considered in the decision of whether to move to a continuing care facility or age in place in one's home?



ChatGPT

Deciding between moving to a continuing care facility and aging in place at home involves a multifaceted evaluation of personal, health, financial, and social factors. Each option offers its advantages and challenges, and the best choice depends on the individual's unique situation and preferences. Here are some key criteria to consider:

Personal and Health Considerations:

- **Health Status and Care Needs:** Assess current health conditions and anticipate future care needs. Continuing care facilities offer a range of services from independent living to skilled nursing care, which can adapt to changing health situations. Aging in place may require modifications to the home and in-home care services.
- **Mobility:** Evaluate mobility and the ability to perform daily activities independently. Limited mobility might necessitate the accessible design of a care facility.
- **Safety:** Consider safety issues, including fall risks and the ability to respond to emergencies. Care facilities are designed with safety in mind, whereas aging in place might require home modifications.
- **Personal Preferences:** Reflect on personal comfort and lifestyle preferences, such as the desire for privacy, independence, and the familiarity of one's home.

Financial Considerations:

- **Costs:** Compare the costs of both options, including long-term care insurance, government assistance, and out-of-pocket expenses. Continuing care facilities can be expensive, but aging in place may involve costs for home modifications, maintenance, and in-home care services.
- **Asset Management:** Consider how moving to a facility or staying at home will affect asset and estate planning.

Social and Emotional Considerations:

- **Social Network:** Think about the importance of being near family, friends, and community. Care facilities often offer social activities and a built-in community, while aging in place may require more effort to maintain social connections.
- **Emotional Attachments:** Weigh emotional ties to the home and community, which can significantly impact mental and emotional well-being.

Practical Considerations:

- **Accessibility to Services:** Evaluate access to healthcare, shopping, transportation, and other essential services from both the home and the care facility.
- **Home Adaptability:** Consider the feasibility and cost of modifying the home to accommodate aging-related needs, such as installing ramps, grab bars, and accessible bathrooms.
- **Support System:** Assess the availability and willingness of family, friends, or professional caregivers to provide support if choosing to age in place.

It's often beneficial to discuss these considerations with family members, healthcare providers, financial advisors, and aging-in-place or eldercare specialists to make a well-informed decision that aligns with personal values, needs, and circumstances.

Meaningful, Reliable Information:

Example: “How Does the Grain Elevator Business Work?”

 You

How does the grain elevator business work?

 ChatGPT

The grain elevator business operates as a key component of the agricultural supply chain, providing critical services for the storage, handling, and sometimes marketing of bulk grain. Here's an overview of how this business works:

1. **Storage:** Grain elevators offer storage facilities for farmers' harvested grain. This is essential for managing the supply of grain, as harvest times are seasonal but demand for grain is year-round. Elevators can provide a controlled environment to preserve the quality of the grain.
2. **Aggregation:** By collecting grain from numerous farms, grain elevators aggregate the product into larger, more manageable quantities. This aggregation makes it easier to sell and transport the grain to various markets.
3. **Handling and Logistics:** Grain elevators are equipped with machinery for moving grain in and out of storage. This includes equipment like conveyors, bucket elevators, and scales for weighing. Efficient handling is crucial for maintaining the quality of the grain and minimizing losses.
4. **Market Intermediary:** Grain elevator operators often act as intermediaries between farmers and the market. They can purchase grain from farmers, store it, and then sell it to buyers like millers, feed companies, and exporters. This role involves understanding market trends and prices to ensure profitability.
5. **Price Risk Management:** The grain elevator business can be affected by fluctuating grain prices, which are influenced by global supply and demand, weather conditions, and other factors. To manage this risk, elevator operators may use futures contracts and other hedging strategies to lock in prices for grain they buy or sell in the future.
6. **Quality Control:** Maintaining the quality of stored grain is vital. This involves regular monitoring for temperature, moisture, and pests. Some grain elevators have facilities to clean, dry, and blend grain to meet specific quality standards required by buyers.
7. **Transportation:** Grain elevators are typically located strategically near farms, rail lines, or ports to facilitate easy transport of grain to domestic or international markets. They play a key role in loading grain onto trucks, trains, or ships for further distribution.
8. **Services and Fees:** Grain elevators generate revenue by charging fees for their services, which can include storage fees, handling charges, and fees related to risk management and logistics services.
9. **Compliance and Regulation:** The grain elevator business must comply with various regulations related to food safety, storage, handling, and environmental standards. This can involve regular inspections and adherence to specific operational practices.

Overall, the grain elevator business is essential for bridging the gap between farmers and the broader market, playing a crucial role in the agricultural economy by facilitating the efficient storage, management, and distribution of grain.

“Who are the key players?”



You

Who are the key players?



ChatGPT

The key players in the grain elevator business encompass a range of entities involved in the storage, handling, and marketing of grain. These include:

1. **Local Cooperatives:** These are farmer-owned organizations that operate grain elevators to serve their members. They play a significant role in rural areas, providing essential services to local farmers, including grain storage, marketing, and often supplying inputs like seeds and fertilizers.
2. **Agribusiness Companies:** Large agribusiness firms are major players in the grain elevator sector. They own and operate extensive networks of grain elevators, storage facilities, and terminals. Examples include Cargill, Bunge Limited, and ADM (Archer Daniels Midland Company). These companies are involved in various stages of the food supply chain, from production to processing and distribution.
3. **Independent Grain Elevator Operators:** These are privately owned businesses that operate grain storage facilities. They can range from single-location operations to companies with multiple sites. Independent operators might serve specific niches or regions.
4. **Farmers:** While primarily customers of grain elevator services, farmers can also be key players, especially those who own or invest in their own storage facilities. In some cases, farmers may form groups to build and operate community grain elevators.
5. **Commodity Traders:** These are firms and individuals who trade in grain commodities. They play a crucial role in the marketing and pricing aspects of the grain elevator business, often working with elevator operators to buy and sell grain on behalf of clients or for speculative purposes.
6. **Logistics and Transportation Companies:** Given the importance of transportation in the grain elevator business, companies specializing in rail, trucking, and shipping are key players. They partner with grain elevator operators to ensure efficient and cost-effective transport of grain to various markets.
7. **Regulatory Bodies:** Government agencies and regulatory bodies overseeing agricultural practices, food safety, and trade are key players in setting the rules and standards that grain elevator operators must follow. In the United States, for example, the USDA (United States Department of Agriculture) and the FDA (Food and Drug Administration) play significant roles.
8. **Technology Providers:** Companies that provide specialized technologies and equipment for grain storage, handling, and monitoring are crucial for the operational efficiency of grain elevators. This includes providers of grain drying equipment, storage solutions, and software for inventory and quality management.

These players interact within the grain elevator ecosystem, each contributing to the efficient functioning of the grain supply chain. The landscape can vary by region, with different entities playing more dominant roles depending on local agricultural practices and market structures.

But it falls short when asked about specifics.

SE You

Which company moves the most tonnage of grain in the US? What is that tonnage?

 ChatGPT

ADM is recognized as the top grain major in North America in terms of licensed grain storage capacity, according to World Grain's 2023 rankings. While this ranking highlights ADM's significant infrastructure and capacity within the grain industry, it doesn't directly provide the tonnage of grain moved. For precise tonnage figures, more specific operational data from the companies would be required, which might not be publicly available ([World Grain](#)).

SE You

How should I think about the profit margin of a grain elevator? What are the average margins?

 ChatGPT

Thinking about the profit margin of a grain elevator involves considering the balance between storage fees, handling charges, and the costs of purchasing and maintaining grain. The profit margins for U.S. grain elevators have seen improvements after periods of limited profitability, influenced by factors such as global grain supply and farmers' selling behaviors. The specifics of average margins can vary and depend on market conditions, operational efficiency, and the strategies employed by each elevator. For detailed insights and trends in profit margins for grain elevators, you might find the analysis by World Grain useful ([World Grain](#)).

SE You

How should one think about the market size of the grain merchandising business in the US?

 ChatGPT

The U.S. grain merchandising market is experiencing several challenges that impact its size and functioning. Factors such as the concentration of grain origination assets, increased competition from various end users, and the entrance of new players with different objectives are squeezing margins. Additionally, major grain companies are controlling a larger portion of grain origination assets but still face profitability challenges. The grain market is also affected by increased competition in export markets, especially from Brazil and the Black Sea region, which challenges the U.S. export status ([World Grain](#)). For more detailed insights, you can read the full article on World Grain.

Conclusions

- ChatGPT gets you into the right ballpark
- There's plenty of human work still needed
- The train of generative AI is on a collision course with the mountain of copyrighted and confidential information.

What else is advancing the profession (I)?

Advances in Behavioral Decision Research



<http://pubsonline.informs.org/journal/mnsc>

MANAGEMENT SCIENCE
Vol. 67, No. 9, September 2021, pp. 5364–5378
ISSN 0025-1909 (print), ISSN 1526-5501 (online)

Innovations in the Science and Practice of Decision Analysis: The Role of *Management Science*

James S. Dyer,^a James E. Smith^b

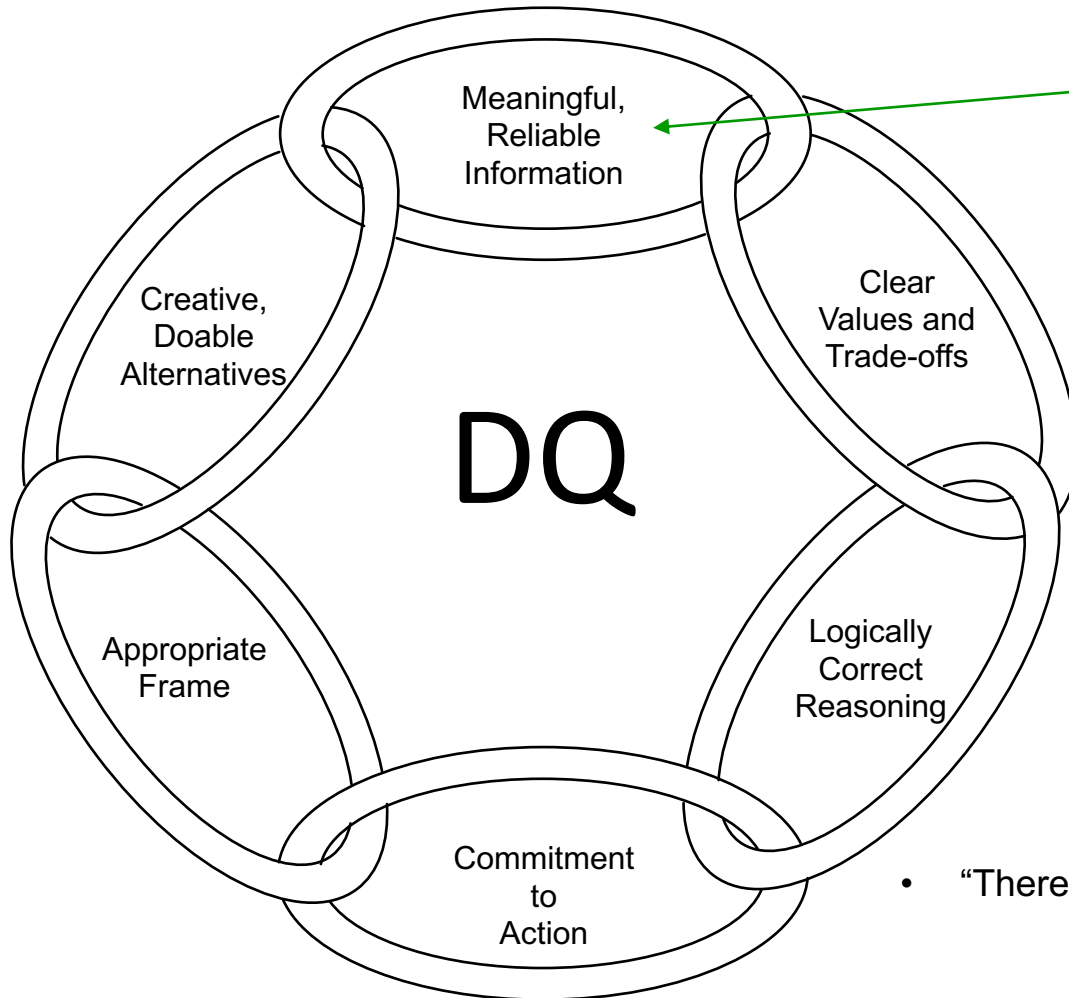
^aMcCombs School of Business, University of Texas at Austin, Austin, Texas 78705; ^bTuck School of Business, Dartmouth College, Hanover, New Hampshire 03755

Contact: jim.dyer@mcombs.utexas.edu (JSD); jim.smith@dartmouth.edu,  <https://orcid.org/0000-0002-9429-7567> (JES)

Behavioral decision research is “winning” at MS. Examples:

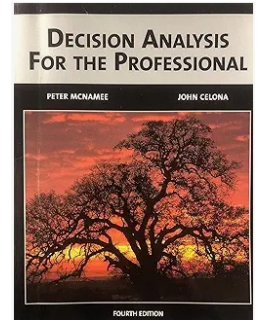
- Budish, Kessler (2022) Can Market Participants Report Their Preferences Accurately?
- He (2021) Revisiting Ellsberg’s and Machina’s paradoxes: ...
- Baucells, Zhao (2020) Everything in Moderation: Foundations ... of the Satiation Model
- Baillon, Bleichrodt, Spinu (2020) Searching for the Reference Point
- Li, Muller, Wakker, Wang (2018) The Rich Domain of Ambiguity Explored

- “There’s only one way to get it right. There are many ways to get it wrong.” - Jim Smith



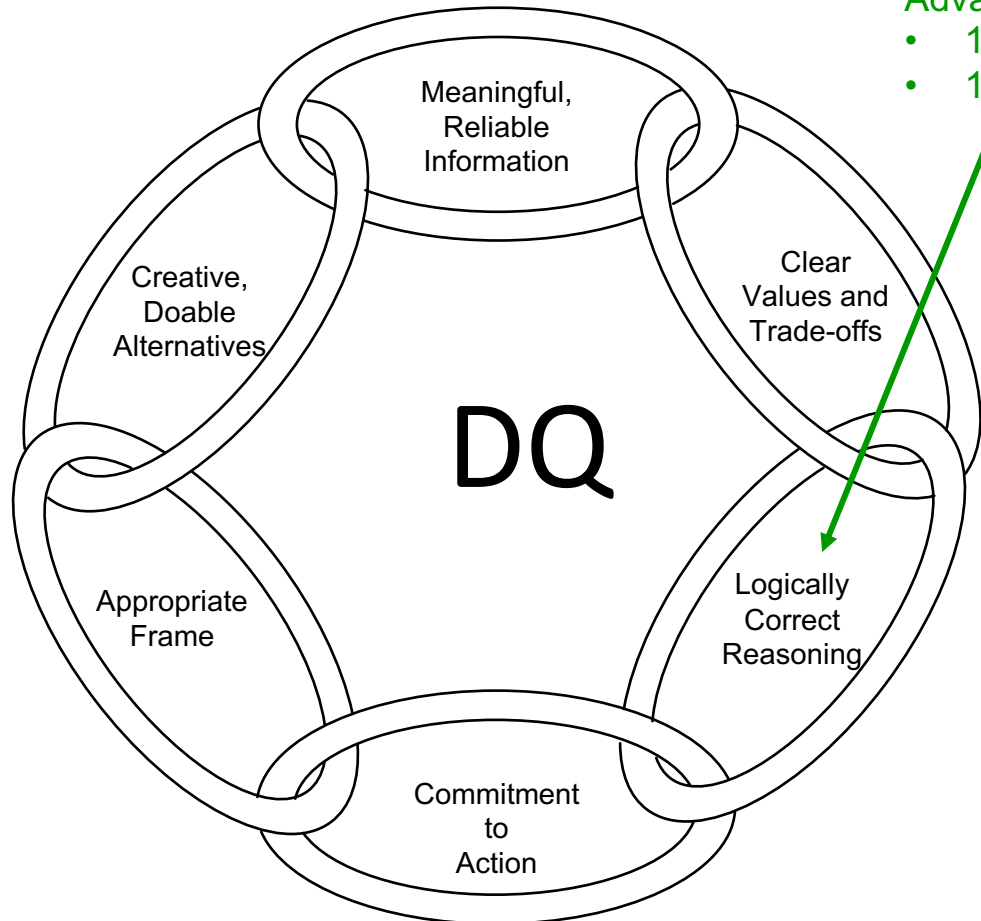
How much this academic research will translate into practice remains to be seen.

What else is advancing the profession (II)?



Advances in Software

- 1960s' – 1980's: Supertree, APL, Fortran, C, Algol, VisiCalc, Lotus 1-2-3
- 1990's – 2010's: Excel, Crystal Ball, At-Risk, Risk Detective, Supertree →



Poll 7

(Vote for *all* that are applicable)

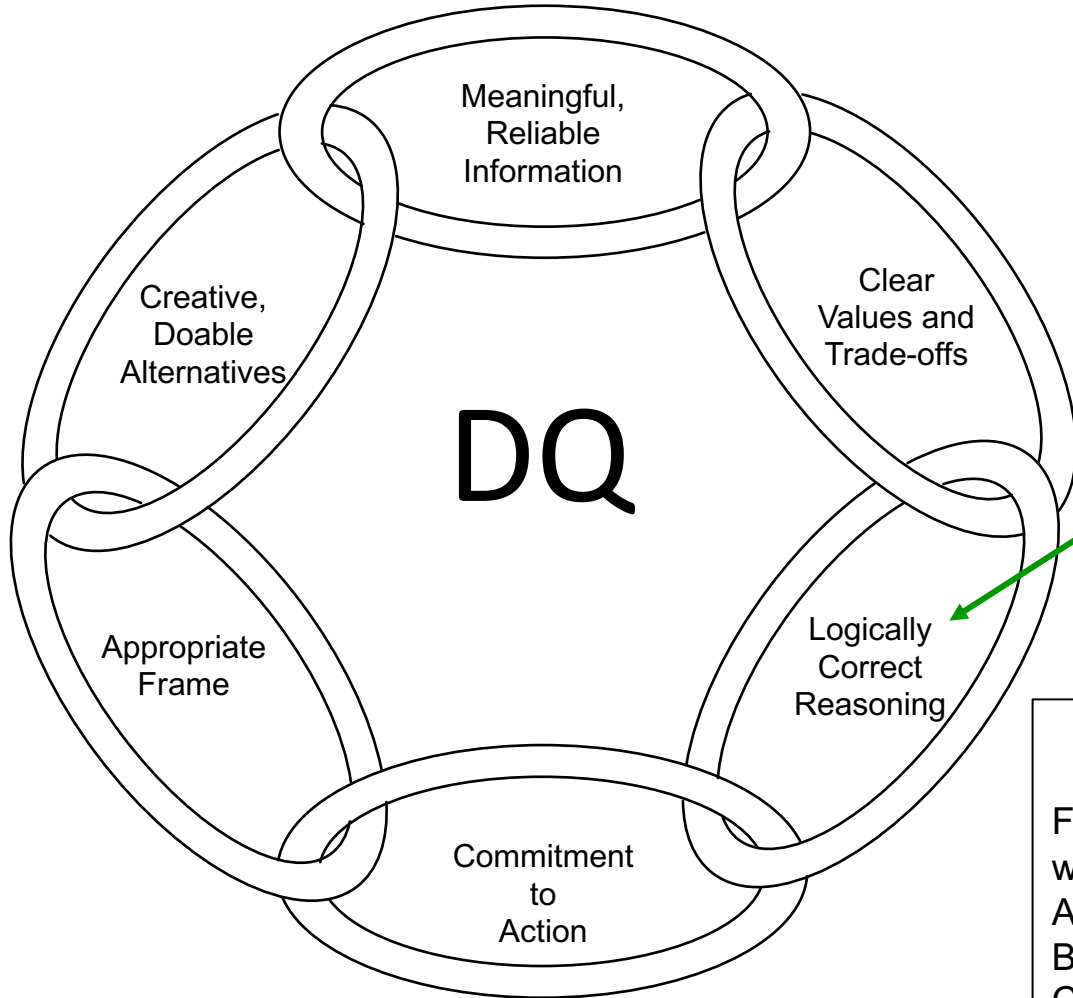
For decision-professional work, we typically use ...

- A. Analytic Solver (Frontline)
- B. Analytica (Lumina)
- C. At-Risk (Palisade)
- D. Crystal Ball (Oracle)
- E. Excel (Microsoft)
- F. GeNIe (Bayes Fusion)
- G. Mathematica (Wolfram)
- H. Portfolio Navigator (SmartOrg)
- I. Python
- J. R
- K. Risk Detective (Rhythm Technology)
- L. SIPmath Modeler Tools (Probability Management)
- M. Supertree
- N. Other ...



Fast-Emerging Frontier
AI-Enhanced Software

What else is advancing the profession (III)?



Quantile-Parameterized Distributions

(QPD's, 2011; Metalogs, 2016, 2019, 2021;
J-QPD's, 2017, 2019)

Features

- Parameterize continuous distributions in closed form with expert-assessed quantiles
- Unbounded, semi-bounded, and unbounded forms

Benefits

- Represent continuous variables as continuous
- Avoid arbitrarily chopping off the tails
- Avoid arbitrary lumpiness
- Simulate in closed form
- Represent simulation results as a smooth PDF
- Can improve decision-making in practice
- No downside

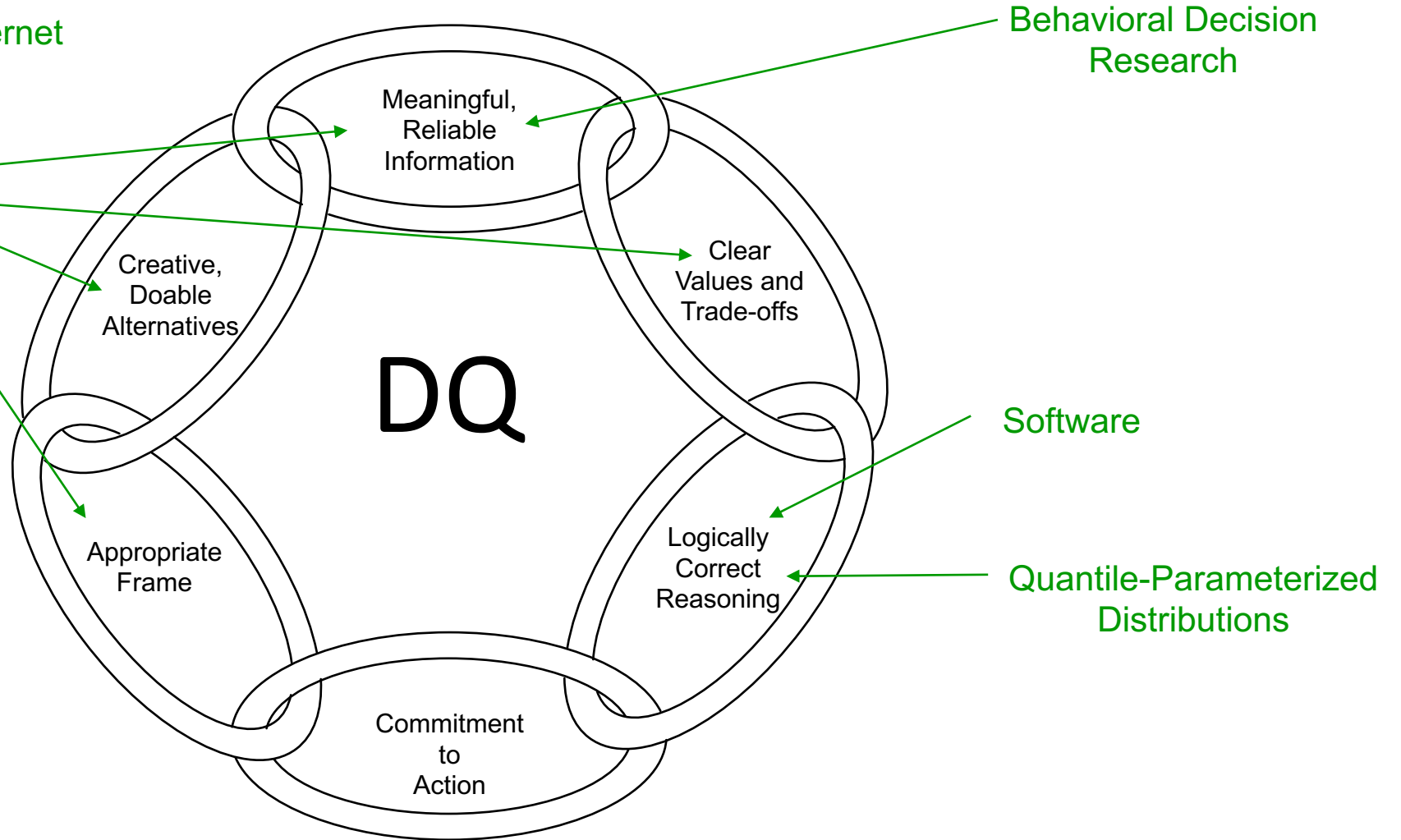
Poll 8

For our decision-professional work, we typically

- A. Use J-QPD's
- B. Use Metalogs
- C. Use traditional distributions
- D. Do *not* use continuous distributions

Summary of Innovations Advancing the Profession

Generative-AI Windows Into the Internet



Thank you !!!