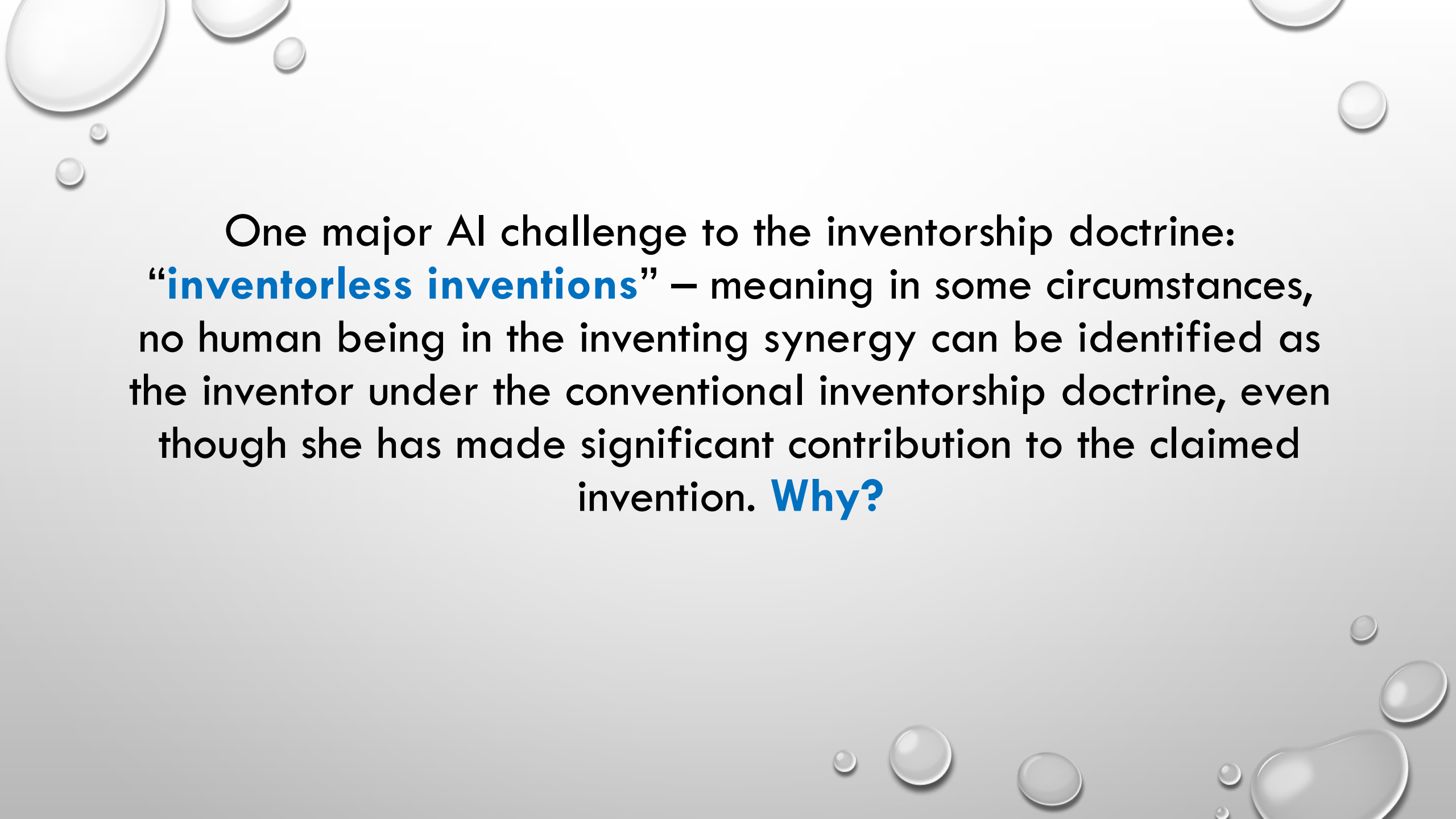




AI AS AN INVENTING TOOL: ITS IMPLICATIONS IN PATENT LAW AND POLICY

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One major AI challenge to the inventorship doctrine:
“**inventorless inventions**” – meaning in some circumstances, no human being in the inventing synergy can be identified as the inventor under the conventional inventorship doctrine, even though she has made significant contribution to the claimed invention. **Why?**

The Anatomy of an Inventing Process – “black box” (Michelle and Surrendran, 2015)

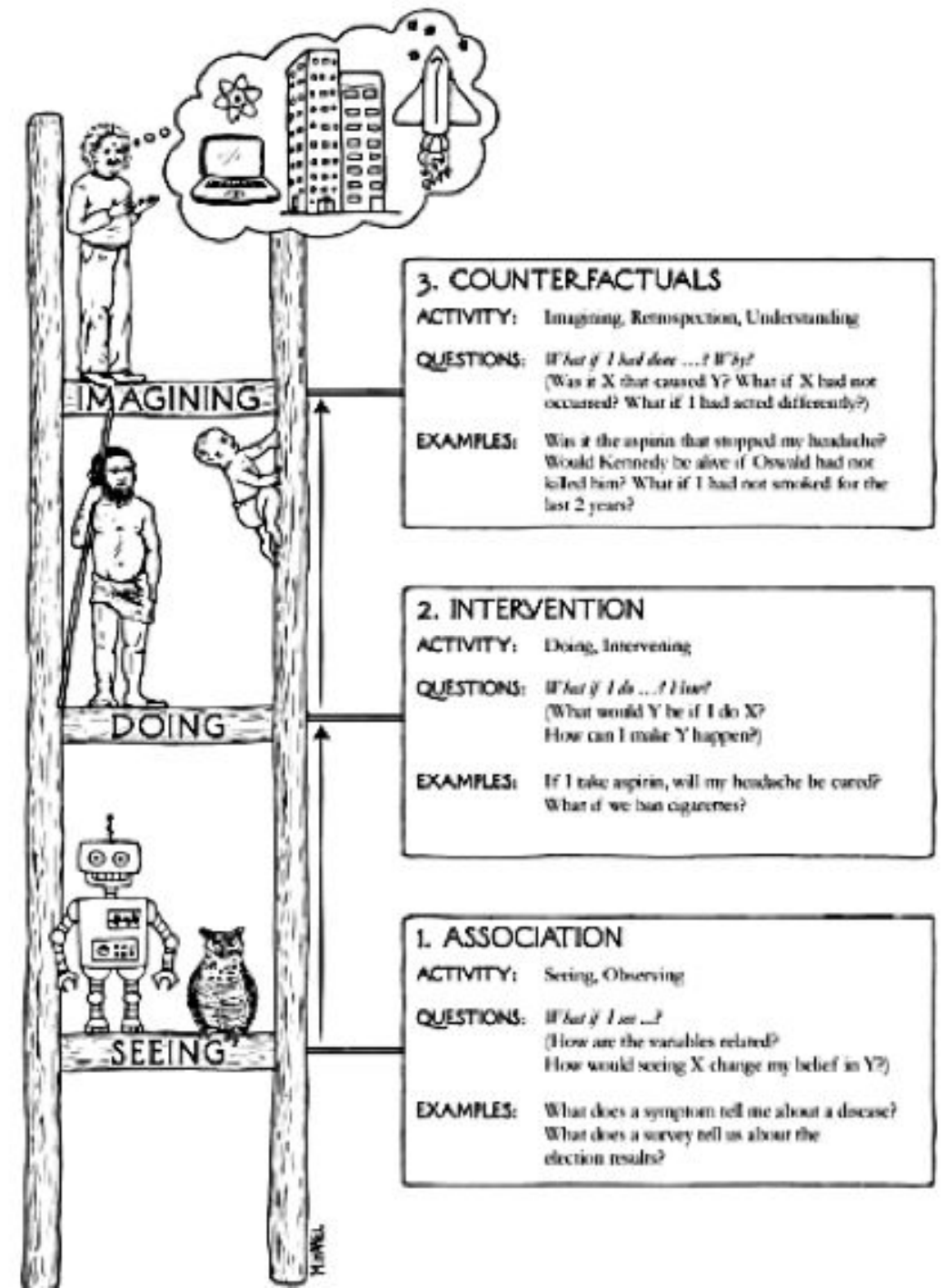
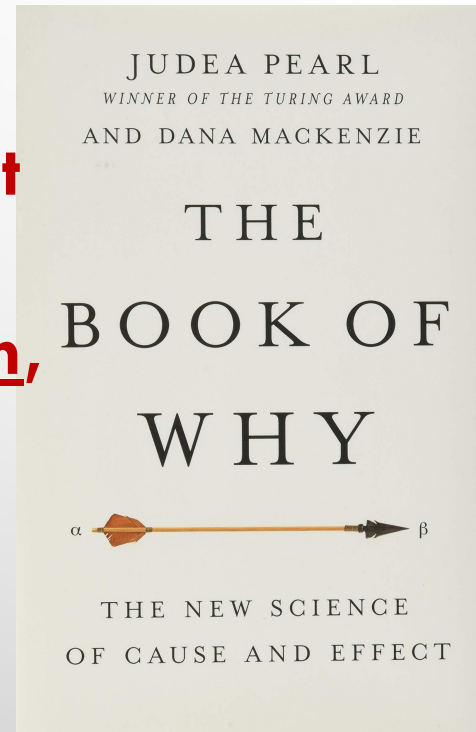
- i. **Problem identification:** an invention usually begins with the “detection of a problem”. “Seeing” the problem that leads to an invention means that there is a specific need to do something differently. (**Human**)
- ii. **Problem defining/framing:** for an efficient invention to start, clarity is always required about the specific problem to be solved. Sometimes the identified problem needs to be further broken into a series of “solvable” sub-problems or questions. (**Human**)
- iii. **Problem / Solution exploration:** an inventive solution usually requires an understanding of existing solutions and their strengths and weaknesses, partly because most inventions involve an evolutionary recombination of existing technologies. This step also involves searching for and predicting potentially novel structural arrangements of principles that meet the defined requirements. Narrowing down solutions may also involve other screening techniques, such as trial and error experiments, until a “working concept” is developed. (**AI or Human + AI**)
- iv. **Invention synthesis and evaluation:** filtering potential solutions into a working concept is also critical to the inventing process. This relates heavily to the inference and reasoning task of identifying how known principles could be integrated into a working concept that meets the problem requirements. (**Human + AI**)
- v. **Invention design:** the working concept needs to be further refined to a robust solution that reliably meets the requirement parameters – refining is an engineering design activity that requires detailed specification and testing. (**Human + AI**)

Contemporary (LLM-Based) AI's Weakness and Strength

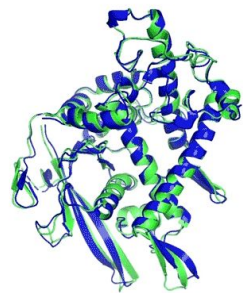
1. Lacking capability to understand causation, It is virtually impossible for AI to detect **real-world challenges**, nor can they **frame** the challenge into a series of technological problems / questions to be tackled.
2. AI can be excellent at **predicting** solutions in certain cases where **the problem space is properly defined**, thus reducing the cost of invention.
3. Compared with conventional lab tools (including conventional computer aid), **AI is now capable of generating something novel, surprising and potentially valuable.**

Reason for AI's Weakness

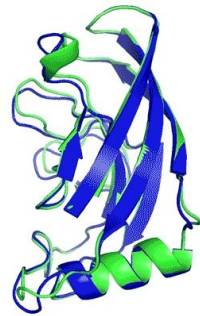
In a nutshell:
Contemporary AI can be remarkably good at detecting correlation/association, but has a weak capability to grasp Causation.



A GOOD EXAMPLE FOR THE CENTAUR'S POWER: **ALPHA-FOLD**



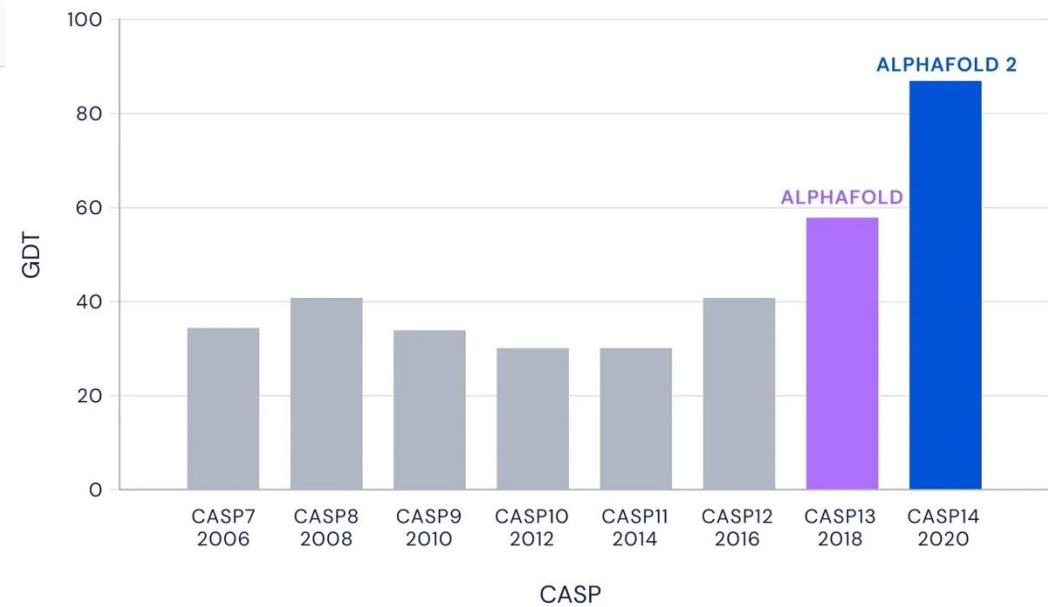
T1037 / 6vr4
90.7 GDT
(RNA polymerase domain)



T1049 / 6y4f
93.3 GDT
(adhesin tip)

● Experimental result
● Computational prediction

Median Free-Modelling Accuracy



The background features a light gray gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

Centaur's Challenge to Inventorship

- Inventorless inventions

AI's Challenge to Inventorship: Inventorless Inventions

- Conception is the touchstone of inventorship, the completion of the mental part of invention. *Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994). Conception is defined as “the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice.” *Hybritech Inc. V. Monoclonal Antibodies, Inc.*, 802 F.2d 1367,1376 (Fed. Cir. 1986)
- Conception is “complete only when the idea is so clearly defined in the inventor’s mind that **only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.**” *Burroughs Wellcome Co. V. Barr Labs., Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994) **(AlphaFold and its progeny: “Conception”?)**
- On the other hand, “merely posing the problem to be solved, or suggesting a desired result to be accomplished” does not constitute conception. **“No matter how specific the identified problem is, conception does not happen lacking a settled and operative solution.”** See *Morgan v. Hirsch*, 728 F.2d 1449 (Fed. Cir. 1984). See also *Singh v. Brake*, 222 F.3d 1362 (Fed. Cir. 2000).

My Proposal: **Constructive Conception**

The human researcher(s) of a Centaur Inventing Synergy can be *deemed* as having *constructively* conceived of the inventive idea, if he/she simultaneously fulfills the following three pre- conditions:

- (i) she is the one that discovered / defined the specific problem to which the AI eventually predicted the solution;*
- (ii) she is the first human being that grasps the inventive-step / non-obviousness of the specific and settled idea of the solution; and*
- (iii) she makes an adequate disclosure of the AI's specific role in the inventing process.*

1. It acknowledges human beings' unique role of problem finding and framing in the new inventing paradigm;
2. It put human agency at the center;
3. It leaves space for the argument that the non-obviousness doctrine should pay much more attention to the problem finding part, particularly in the AI age;
4. It's supported by deeper IP principles such as the principles of dignity and efficiency.
5. Moderate change in the common mid-ground between IP Utilitarians and IP Humanitarians

The background features a light gray gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance. The largest droplets are in the top-left and bottom-right corners, while smaller ones are scattered throughout.

Centaur's Challenge to Non-Obviousness

Our Proposal
(Hao &
Merges): a
Three-bodied
Framework

The Skill Level of PHOSITA

The Scope and Content of Analogous
Art

**The Human's Role:
"Non-obviousness" in Problem
Finding / Framing**

“[I]t is artificial, so far as thinking is concerned, to start with a ready-made problem, a problem made out of whole cloth or arising out of a vacuum... **Conventional patent law doctrines are out of step** with how scientific and technical research actually take place in the laboratory; problem-finding and problem-framing are key rate-limiting steps in the formulation of breakthrough ideas – steps that deserve more attention from a law and policy perspective.”

Laura P. Farina, *The Social Origin of Innovation Failure*, 70 SMU L. Rev. 377 (2017)



In re Omeprazole Patent Litigation, 536 F.3d 1361 (Fed. Cir. 2008)

- The invention involved applying enteric coatings to a drug in pill form for the purpose of ensuring that the drug did not disintegrate before reaching its intended site. **The claimed formulation included two layers of coatings over the active ingredient.**
- The D.C. rejected Apotex's defense that the patents were invalid for obviousness. Apotex had argued that the claimed invention was obvious because coated omeprazole tablets were known from a prior art reference, and because secondary subcoatings in pharmaceutical preparations generally were also known. There was no evidence of unpredictability associated with applying two different enteric coatings to omeprazole. **However, Astra's reason for applying an intervening subcoating between the prior art coating and omeprazole had been that the prior art coating was actually interacting with omeprazole, thereby contributing to undesirable degradation of the active ingredient. This degradation by interaction with the prior art coating had not been recognized in the prior art.** Therefore, the district court reasoned that based on the evidence available, a person of ordinary skill in the art would have had no reason to include a subcoating in an omeprazole pill formulation.
- **The Federal Circuit affirmed.**

***In re Omeprazole Patent Litigation*, 536 F.3d 1361 (Fed. Cir. 2008)**

- **“The *Omeprazole* case can also be analyzed in view of the discovery of a previously unknown problem by the patentee. **If the adverse interaction between active agent and coating had been known, it might well have been obvious to use a subcoating.** However, since the problem had not been previously known, there would have been no reason to incur additional time and expense to add another layer, even though the addition would have been technologically possible. This is true because the prior art of record failed to mention any stability problem, despite the acknowledgment during testimony at trial that there was a known theoretical reason that omeprazole might be subject to degradation in the presence of the known coating material.”**

USPTO, M.P.E.P, S. 2143: EXAMPLES OF BASIC REQUIREMENTS OF A *PRIMA FACIE* CASE OF OBVIOUSNESS [R-07.2022]

A Few Thoughts and Policy Suggestions

- I don't believe "everything will be obvious". **Patent law should pay more attention to the non-obviousness as embodied in the problem-finding and problem-framing part of an inventing process, which will largely stay a place where the "spark" of human creativity shines.**
- This suggestion is also in harmony with my previous proposal of "constructive conception", which helps to qualify **human researchers that found/framed a non-obviousness problem** as inventors (with other conditions fulfilled).
- Facing the various challenges the AI-assisted inventing/creative process poses to IP, we should have a holistic approach to address these challenges, with the eventual purpose of promoting human creativity, rather than displacing it.



THANK YOU! QUESTIONS?
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