

Outsmarting Pac Man with Artificial Intelligence, or Why AI- Driven Cartel Screening is not a Silver Bullet

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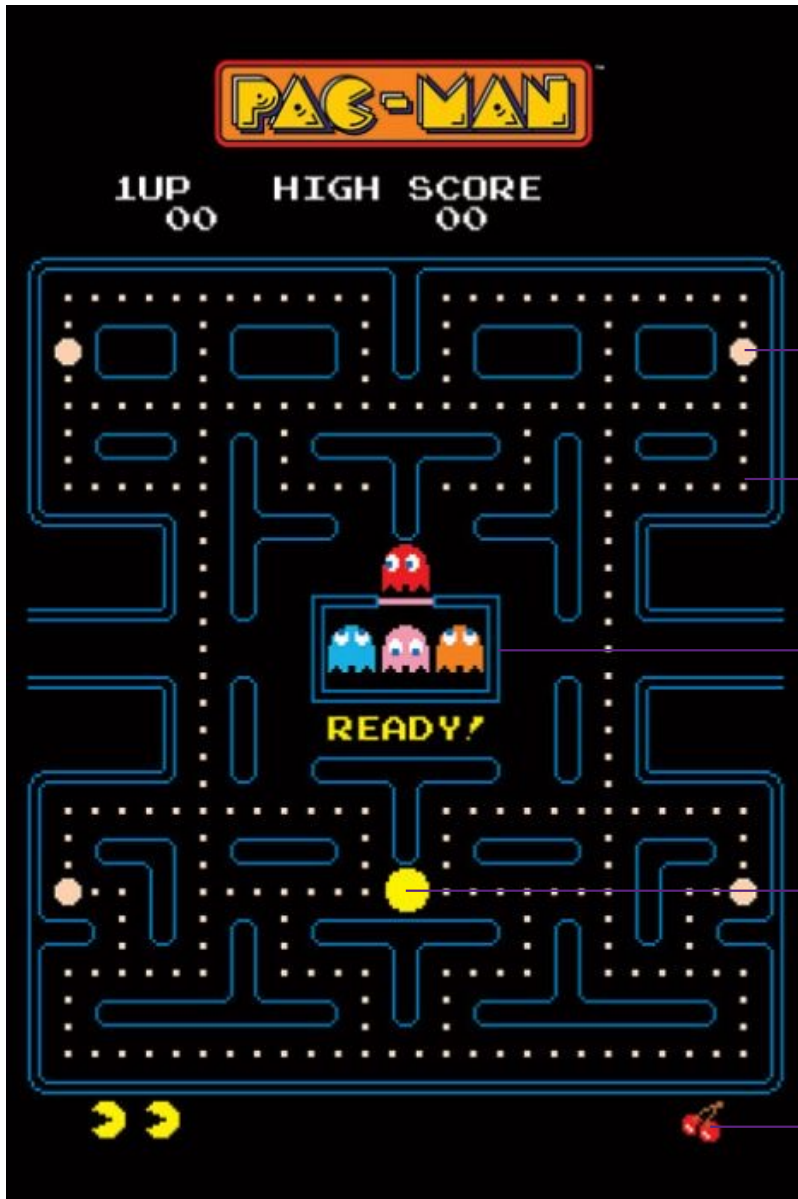


A photograph of a classical building facade, likely the University of Liège. The image shows a large archway with a Latin inscription. Above the arch is a golden coat of arms. Below the arch is a relief sculpture. The image is partially overlaid by a purple geometric shape in the bottom left and a white geometric shape in the bottom right.

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I. Introduction

I. Introduction: Pac-Man is a cartel (Schinkel 2014)



Leniency programme

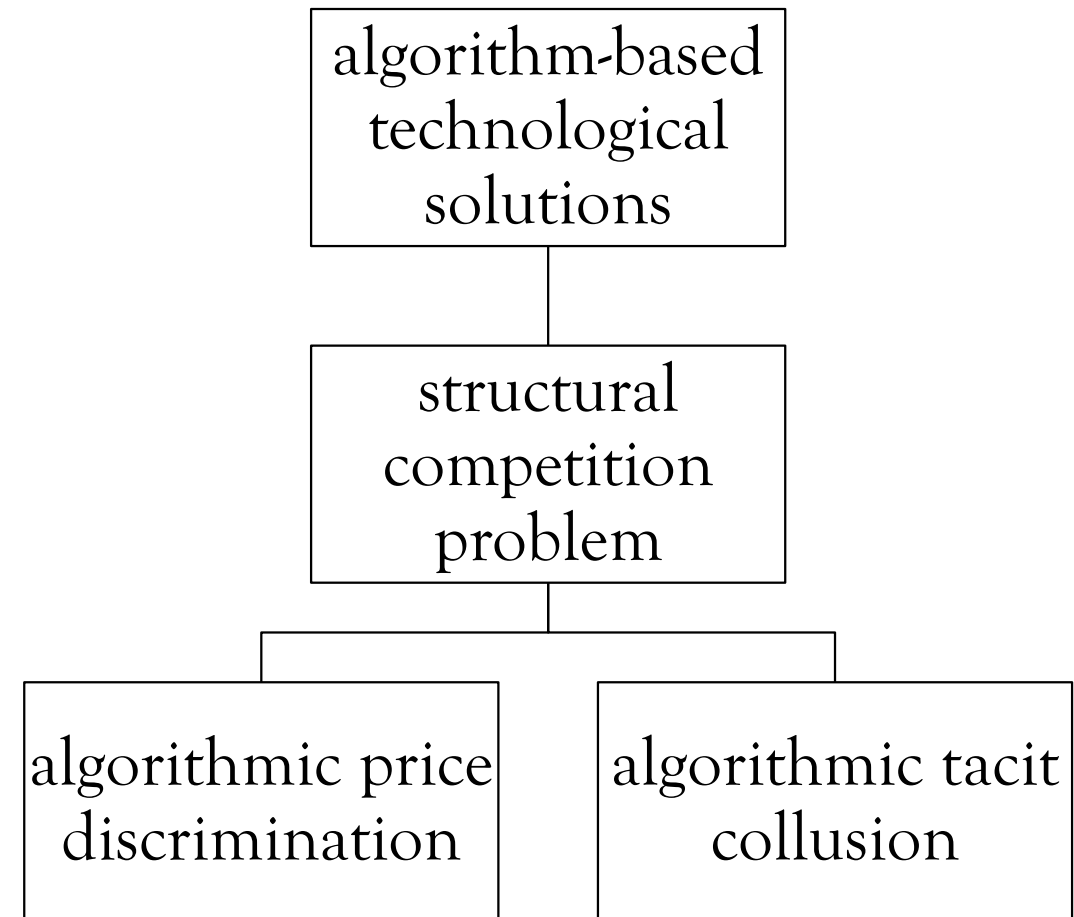
Consumer surplus

(National) competition authorities

International cartel

Occasional windfall profit

I. Introduction: AI as a threat





I. Introduction: AI as a tool

- ▶ AI-driven cartel screening (Huber and Imhof 2019)
 - › Flags unusual patterns
 - › Triggers the need for further investigation
 - » e.g.: dawn raid

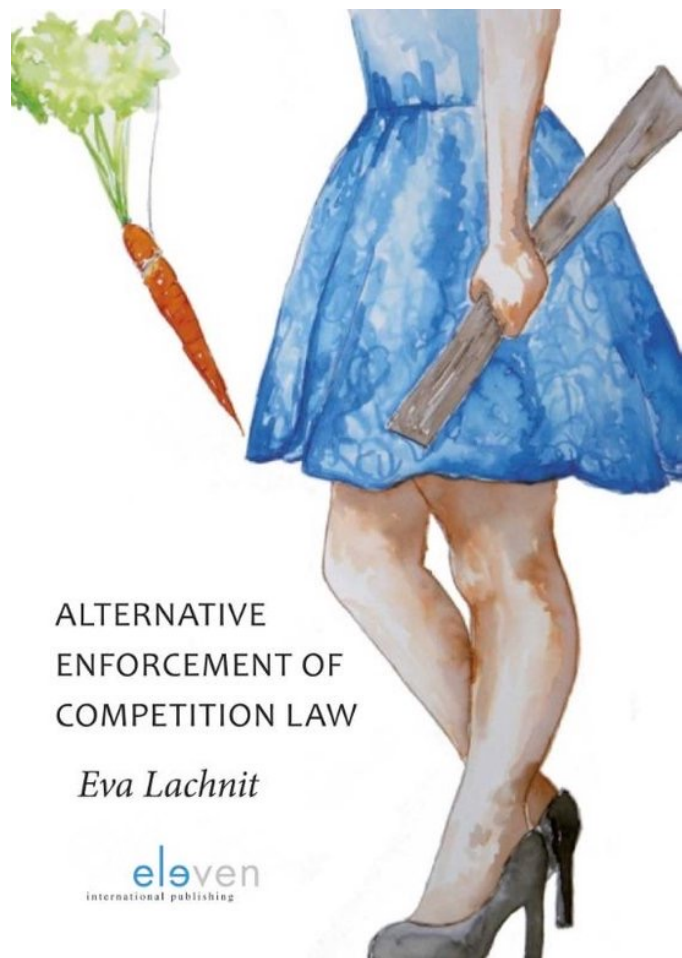




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II. Soft Carrots and Hard Sticks

II. Soft Carrots and Hard Sticks



- ▶ Undertakings are (supposed to be) rational utility maximisers
 - › Participation constraint
 - » cartelisation gain > sanction
 - › Incentive constraint
 - » cartelisation gain > deviating gain
- ▶ Two ways to destabilise a cartel
 - › Hard sticks: Increasing sanction
 - › Soft carrot: Increasing the gain driven from deviation

A. Hard Stick



- ▶ “The value of the punishment must not be less in any case than what is sufficient to outweigh that of the profit of the offence” (Bentham)
- ▶ However:

$$E[S] > \left(\frac{E[G]}{P_D} + C_{\text{enforcement}} \right) * A$$

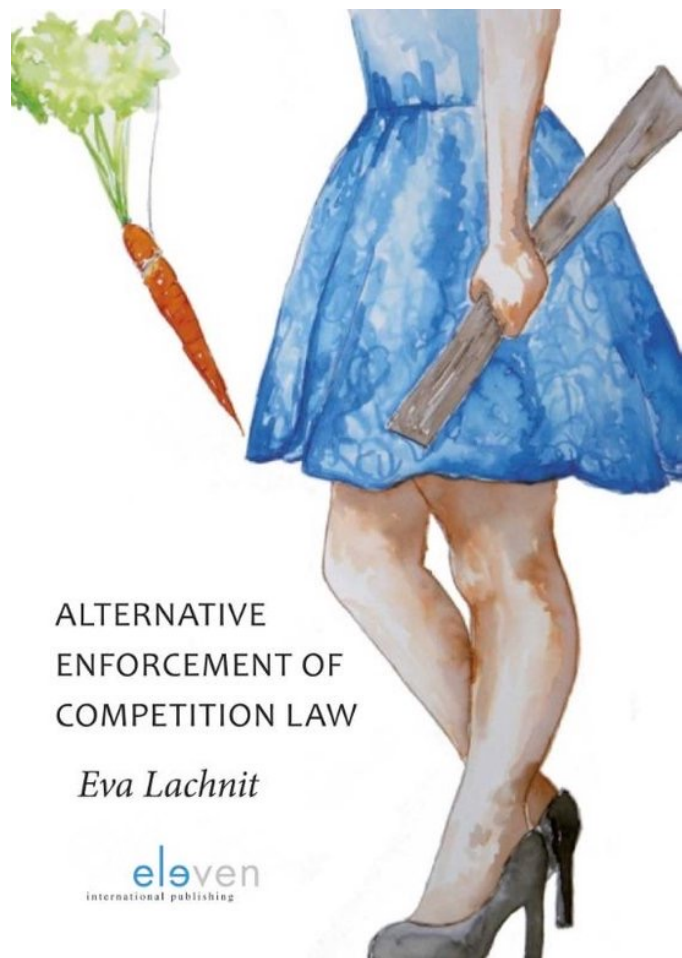
B. Soft Carrots



► Leniency: increasing detection (?)

Position	Reduction	Reduction after investigation starts
1st	Immunity	30-100%
2nd	30-50% of the fine	20-30%
3rd	20-30%	Up to 20%
Subsequent	Up to 20%	

II. Soft Carrots and Hard Sticks



- ▶ Controversial success
 - › Sanction is a function of detection
 - › Yet, probability of detection is low
 - › Leniency is a way to increase the probability of detection
 - › Yet, probability of detection decreases the effectiveness of leniency
- ▶ “While there is a recognition that a leniency program is an immensely valuable tool (...) concerns arise when it is the *only* tool” (Harrington and Chang 2015)



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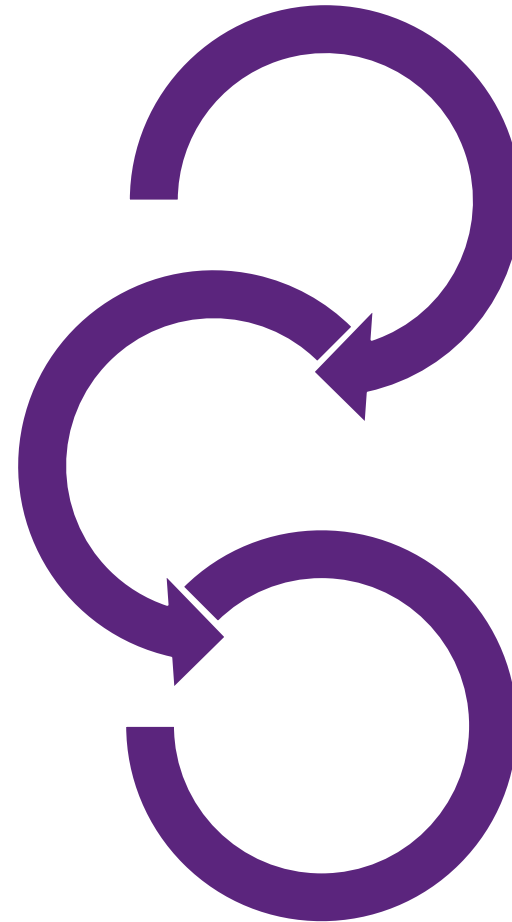
III. Alternative: Cartel Screening

- A. Strengthening Competition Law Enforcement
 - B. Definition and promises



III. Alternative: cartel screening

- ▶ “Algorithmic shift in the fight against cartels” (de Marcellis-Warin, Marty and Warin 2022)
- ▶ AI systems draw the sketch of suspicious businesses by identifying cartelists’ recurring characteristics or patterns (Sanchez-Graells 2019)



Increasing the probability of detection...

...Increases the incentive to apply for leniency...

...that in turn deters cartel formation.



III. Alternative: cartel screening

- ▶ How does it work?
- ▶ There is “*conventional wisdom on collusion*” that permits the identification of “*factors that are supposed to hinder or facilitate*” collusive behaviours (Tirole 1988)
 - › Structural screens: analysis of market structure
 - › Behavioural screens: analysis of the collusive methods or outcome of collusion

Structural screens



Structural screens		High probability of cartelisation
Structural factors	Number of firms (concentration)	Low (high)
	Entry barriers	High
	Undertakings' interaction	Frequent
	Transparency	Low demand side, high supply side
Supply-side factors	Vertical product differentiation	Homogeneous product
	Innovation	Low-innovative markets
	Advertisement	Low-advertising industries
Demand-side factors	Demand	Stable
	Buyer bargaining power	Low
	Horizontal product differentiation	Low differentiation

Behavioural screens



Collusive markers		Collusive behaviour
Price	Price evolution	<p>Low variance</p> <p>Sharp increase in high price-cost margin</p> <p>Sharp decline of price followed by sharp increase</p>
	Product price and quality	Homogenisation through increased product standardisation and pricing formula
	Prices across customers	Decrease of customer-specific prices
Market shares	Sales quotas	Distribution of market shares seems more stable under collusion
	Exclusive territories	Price increase in the home-market, export decreases
	Customer allocation	Stable customer base
Enforcement	Buy-back	In time t a firm A sells above its historical market share while a firm B sells below its historical market share; in $t+1$, A buys products from B
	Compensation	In time t a firm A sells above its historical market share while a firm B sells below its historical market share; in $t+1$ the sale levels are inverted



III. Alternative: cartel screening

Cartel screening does

- ▶ Screens identify patterns of collusion
- ▶ Screens trigger the need for, e.g., dawn raids

Cartel screening does not

- ▶ Screens do not prove collusion





III. Alternative: cartel screening

- ▶ Studies demonstrate (AI-driven) cartel screening works
 - › Detection of illegal agreements (Coglianese and Lai 2022)
 - › Detection of corruption (e.g., in public procurement)
- ▶ However, AI-driven cartel screening “still has sceptics” (Abrantes-Metz 2014)
- ▶ This algorithmic solution faces three challenges



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IV. Pitfalls

- A. Data Challenge
- B. Algorithmic Challenge
- C. Human Challenge



A. Data Challenge

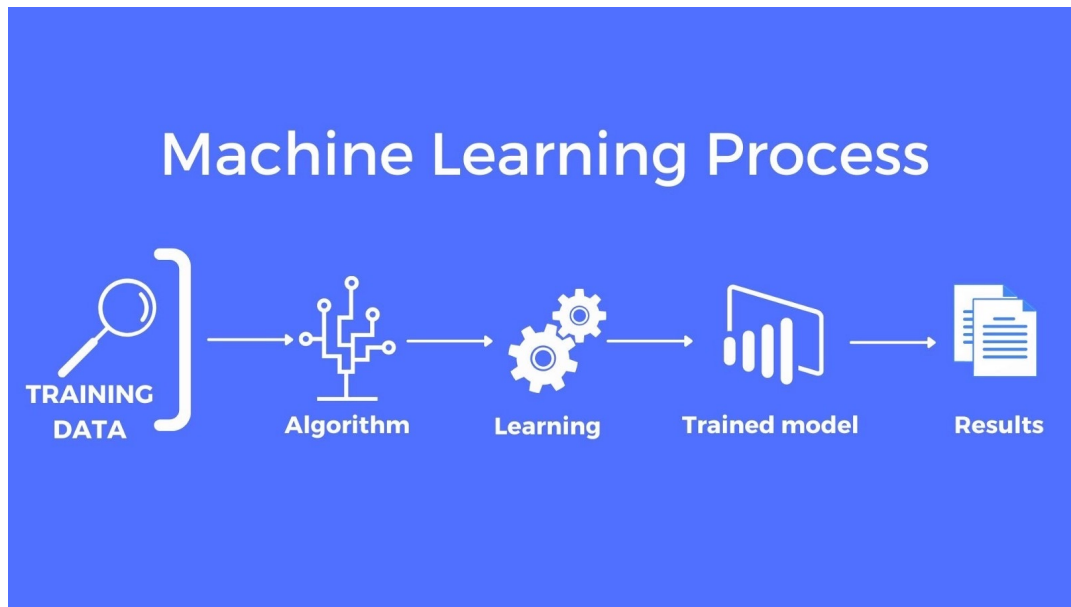
Availability – Quality – Governance



A. Data challenge

Data availability: “no data, no fun”

Data quality: “dirty data, bad prediction”





A. Risk of Type II Error – non-detection of cartel

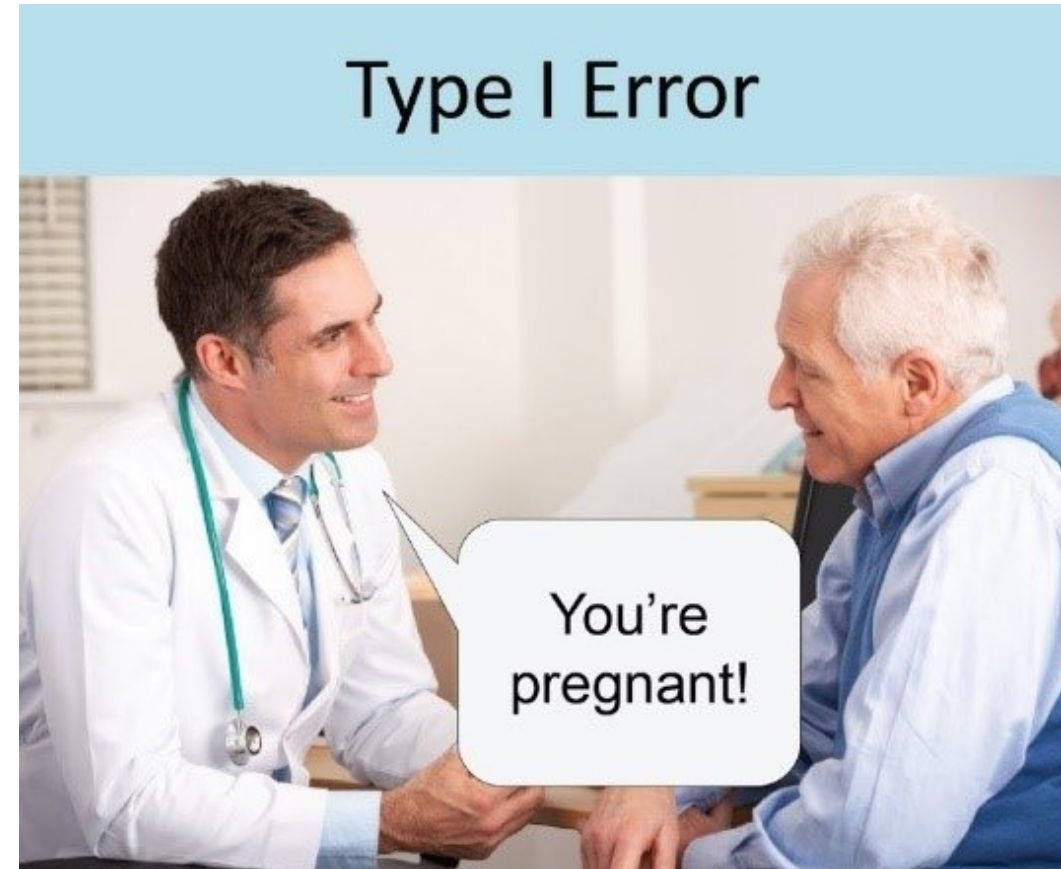
- ▶ “With oligopoly, everything is possible” (Stiegler 1964)
 - › *Animal Feed Phosphate Cartel*
- ▶ Interaction between collusive markers
 - › In principle, demand fluctuations hinder collusion
 - › But an increase in demand fosters collusion when entry barriers are sufficiently high
- ▶ Selection bias
 - › Are discovered cartel statistically representative of the whole population of cartel?





A. Risk of Type I error – Mistakenly detecting a cartel

- ▶ Erroneously condemn competitive behaviour
- ▶ Waste of time and resources
- ▶ Screening does not distinguish between parallelism and anticompetitive behaviour





A. Data Challenge – Governance

- ▶ Competition authorities do not want to lag behind (e.g., UK CMA)
- ▶ “It is a capital mistake to theorize before one has data” (Conan Doyle 1889)
 - › The algorithmic cart should not be put before the data horse
 - › Construct a better data architecture before developing AI-driven cartel screening





A. Data Challenge – Governance

- ▶ Drawing inspiration from the AI Act: article 10 (v.05/2023)
- ▶ “Training, validation and testing data sets shall be subject to data governance appropriate for the context of use as well as the intended purpose of the AI system” (art. 10(2))
- ▶ Art. 10(3) v.04/2021: Training dataset “complete” and “free of errors”
- ▶ Art. 10(3) v.05/2023: Training datasets shall be sufficiently representative, appropriately vetted for errors and be as complete as possible in view of the intended purpose



B. Algorithmic Challenge

Duty to state reasons – Explicability – Human oversight



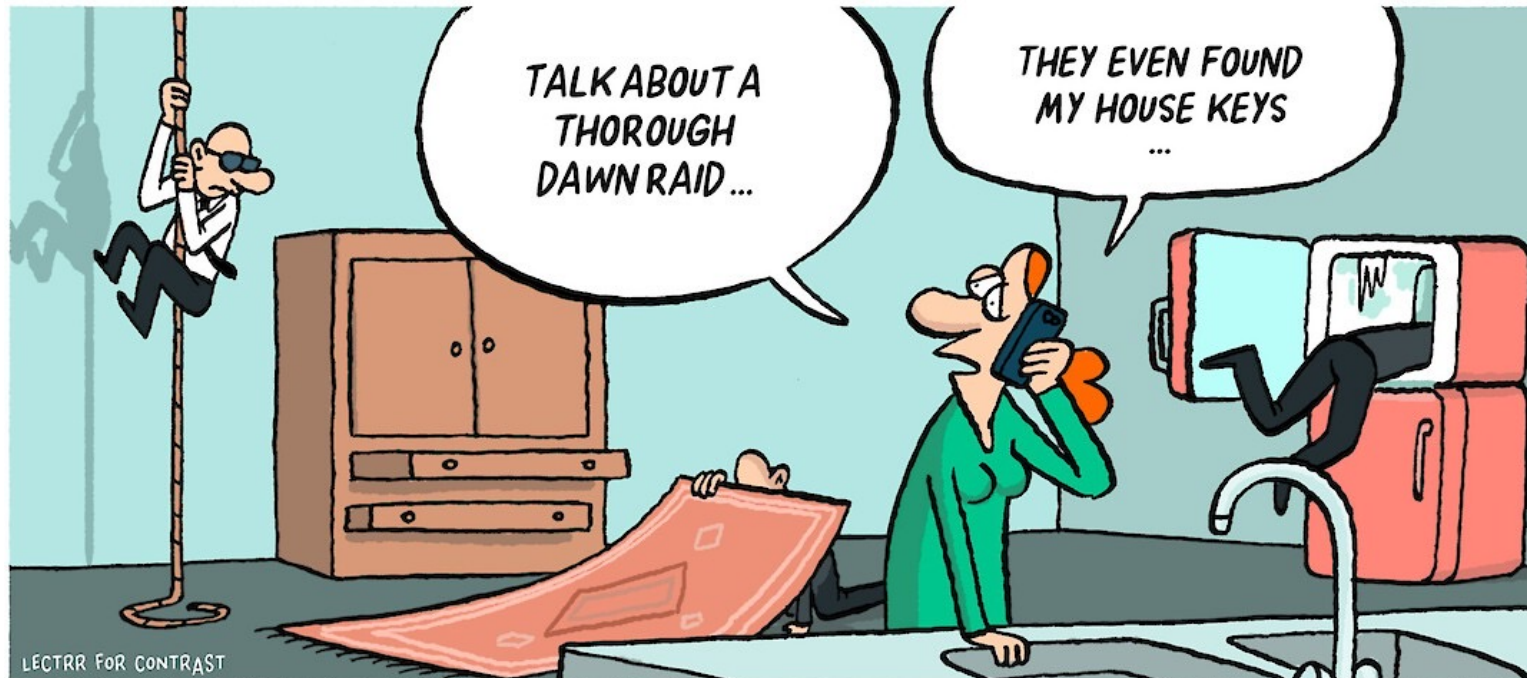
B. Algorithmic Challenge – Article 41 EUCFR

- ▶ “Every person has the right to have his or her affairs handled impartially, fairly and within a reasonable time by the institutions and bodies of the Union.
- ▶ This right includes (...) the obligation of the administration to give reasons for its decisions”
- ▶ The EC has to respect the duty to state reason (*Martinair*)
 - › During preliminary investigations (e.g., *Hoechts*, *Roquette Frères*, *Deutsche Ban*)
 - › And administrative procedures (*Shell International*; *Cimentaries*; *Schindler*)

B. Algorithmic Challenge – Duty to state reasons



- ▶ Cartel screening is useful to trigger a dawn raid
 - › The duty to state reasons applies to dawn raid – *to some extent*
 - › To be in possession of “information and evidence providing reasonable grounds for suspecting infringement of the competition rules by the undertaking concerned” (*Roquette Frères*)



B. Algorithmic Challenge – Duty to state reasons



- ▶ Is a red flag raised by cartel screening a reasonable grounds for suspicion?
(*Roquette frères*)
- ▶ Is the statement of reasons “excessively succinct, vague and generic”? (*Heidelberger Cement*)
- ▶ It depends:
 - › Hypo 1: “The AI system said so” is definitely “excessively succinct, vague and generic”
 - › Hypo 2: if human officer is able to disclose how the different parameters were weighted and to what extent the recommendation was decisive in the final decision, then the duty to state reasons will not be infringed (Yeung 2019)



B. Algorithmic Challenge – Explicability (?)

- ▶ “the degree to which explicability is needed is highly dependent on the context and the severity of the consequences if that output is erroneous or otherwise inaccurate.” (HLEG 2019)
- ▶ Dawn raid are:
 - › Highly intrusive and traumatic for staff (Aslam and Ramsden 2008)
 - › Sometimes conducted without judicial warrant
- ▶ The degree of explicability is expected to be high
- ▶ Hence article 14 AI Act



C. Human Challenge

Discretion – Automation bias – Four-eyes principle

C. Human Challenge – The Exercise of Discretion



- ▶ Explicability goes beyond the algorithmic challenge.
- ▶ The duty to state reasons requires an explanation of the algorithmic operation and an explanation of *the influence that algorithm had on (constraining) human decision-making* (Busuioc 2022).
- ▶ The weight of the recommendation should not be underestimated
- ▶ Going against the recommendation would require a well written reasoned decision that renders “*the exercise of discretion costlier*” (Petit 2018)
 - › “A hearing officer’s belief that computer decisions are error-resistant increases the likelihood of inaccurate outcomes” (Citron 2008)
 - › “Computers also benefits from their traditional reputation of being intelligent and fair, making them seem credible sources of information and advice” (Fogg 2003)



C. Human Challenge – Automation bias

- ▶ Automation bias: the irrational tendency to rely on automated decision even when the operator suspect malfunction (Goddard *et al.* 2012).
 - › Search satisfaction: stop searching once a first plausible explanation is found
 - › Anchoring: premature decision-making based on limited information initially available
 - › Confirmation bias: tendency to interpret information to fit the preconceived opinion
- ▶ Art. 14(4)(b) AIA: “remain aware of the possible tendency of automatically relying or over-relying on the output produced by a high-risk AI system (‘automation bias’)”
- ▶ Is this enough?

C. Human Challenge – Something Old, Something New



- ▶ Within EU competition law proceedings: Combination of investigative and decision-making powers
- ▶ **Prosecutorial bias:** “investigatory teams that have dedicated months to finding enough evidence to support an infringement might suffer from the dreaded ‘tunnel vision’, which could cause them to adopt an unfair or biased decision.” (Lachnit 2016)
 - › biased investigation favouring information concluding to a collusive behaviour (**confirmation bias**) and discarding the others (**hindsight bias and diagnosis momentum**) (Wils 2004)
 - › **Commitment bias:** the unwillingness to adopt a decision that contradict what officials have done in the past due to the involvement of “both the Commission’s human resources and reputation capital” (Teleki 2021)
 - › **Policy bias:** high level of enforcement to keep-up with the statistics (Wils 2004) and because “promotion flow from taking decision” (Forrester 2013)

C. Human Challenge – The Need for a Four-Eyes Principle



- ▶ Four-eyes principle: A approves both the decision and statement of reasons of B
- ▶ Not alien to competition law
 - › Woodrow Wilson
 - › French Competition Authorities
 - » The Investigation Service (*Le Service d'Instruction*): opens investigation, gathers evidence
 - » The Board (*Le Collège*): takes the decision
 - › Belgian Competition Authorities
 - » The Investigation service (*Auditorat*)
 - » The Board (*Le Collège de la concurrence*)

C. Human Challenge – The Need for a Four-Eyes Principle



- ▶ The bicephalic structure enhances procedural fairness (Lasserre 2009)
- ▶ The Authority is no more “the ‘judge, jury, and executioner’ of its own cases.” (Lachnit 2016)
- ▶ Unbiasing decisionmaking: solve the commitment bias
- ▶ AI-driven cartel screening raises similar issue; calls for similar solution
- ▶ An independent team scrutinise the AI and its use: this mitigate the automation bias

C. Human Challenge – The Need for a Four-Eyes Principle



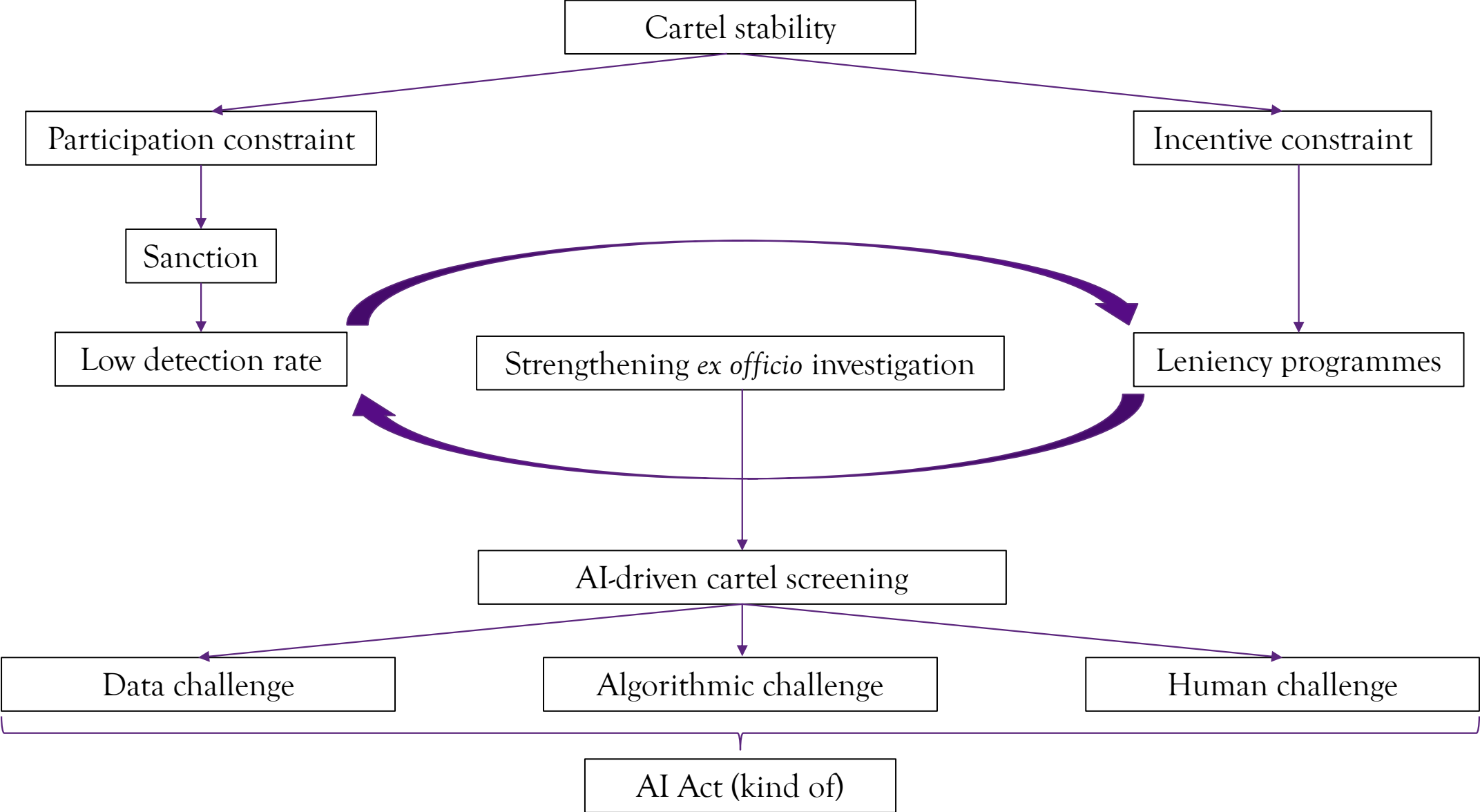
- ▶ Easy to implement in France, Belgium, and other bicephalic institutions
 - › This will prolong the duration of case
 - › But that extra-time might not be wasted
- ▶ Complex to implement in “all-in-one” competition authority (e.g., EC):
 - › No need to split DG Comp
 - › Extension of the Hearing Officer’s role
 - » Already ensures the effective exercise of procedural rights
 - » Already an independent arbiter
 - › The Hearing Officer might well be the proper public overseer of AI-driven cartel screening.



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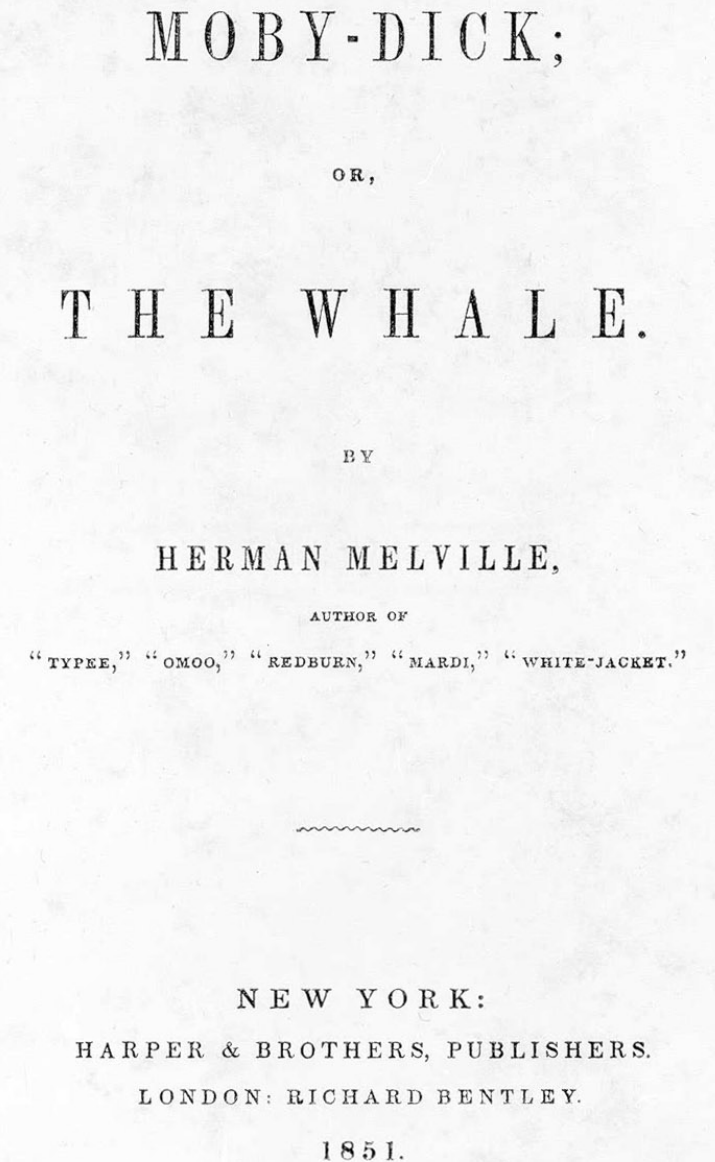
V. Conclusion

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V. Conclusion

- ▶ “When all possibilities (...) become probabilities, every possibility is the next thing to a certainty” (Melville, *Moby Dick*, 1851)
- ▶ Screening raises possibilities of collusion, nothing more (but also nothing less)
- ▶ Competition authorities have to remain aware of AIS’ limitation.
- ▶ If not, they might well be doomed to embody Ahab’s fate, equating probabilities and certainties





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C. Criminalisation of Competition Law

