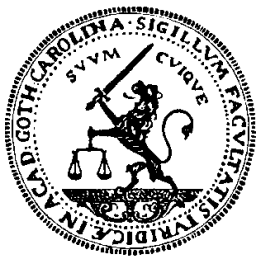

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Culpa in Code: Exploring Autonomous Algorithmic Collusion under EU Competition Law

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Table of contents

Summary

Algorithms wield an increasingly significant influence in our everyday lives. Both in traditional brick-and-mortar markets, and particularly in the digital markets, companies use algorithms for various operations. Instances of algorithmic collusion have already surfaced. However, a more significant threat may await. With the increased capabilities of the most modern algorithms, it has been discussed whether algorithms can act collusively independent of any human intention or conduct, in other words, autonomously.

Within the framework of EU competition law, establishing collusion relies on identifying an agreement or, in its absence, a concerted practice. The Court of Justice has adopted a flexible approach to this "criteria of coordination". However, without giving algorithms a legal personality, one will struggle to argue that autonomous behaviour by algorithms can constitute an agreement. Subsequently, competition watchdogs may face challenges in identifying infringements in such cases.

This thesis thoroughly examines the current legislation and jurisprudence related to the "criteria of coordination", further exploring various academic contributions to determine the meaning and scope. A pivotal aspect addressed is the Court of Justice's quest to balance the interest of consumers with the freedom of undertakings to intelligently operate on the market, employing various terms and presumptions in this pursuit.

Despite the comprehensive exploration, the terms *dolus/culpa,* denoting fault in legal contexts, are notably absent. This raises questions regarding the role of fault in competition law. Since it is difficult to find fault in a situation involving the collision of autonomous algorithms, this thesis contemplates whether EU competition law necessitates the presence of *dolus* and/or *culpa*.

In delving into the realm of algorithmic collusion, this thesis strives to apply the current legal framework to a situation of autonomous algorithmic collusion and models in doctrine. Furthermore, a review of contributions of legal scholars to the question is offered.

This thesis culminates in an attempt to integrate the current legal framework and existing doctrine into a model addressing autonomous algorithmic collusion. Drawing from the discussion on dolus/culpa and borrowing the tort law concept of duty to care, the presented model arguably aligns with existing jurisprudence while effectively balancing the interests at stake.

Sammanfattning

Algoritmer har ett allt större inflytande i vår vardag. Både på traditionella fysiska marknader, men särskilt på de digitala marknaderna, använder företag algoritmer för olika ändamål i sina verksamheter. Konkurrensbegränsande samordning med hjälp av algoritmer har redan förekommit. Likväl är det möjligt att större hot är att vänta. Utvecklingen av algoritmers ökande kapacitet har väckt diskussioner om huruvida algoritmer kan agera konkurrensbegränsade oberoende av någon mänsklig avsikt att göra så.

EU:s bestämmelser om konkurrensbegränsande samarbete mellan företag förutsätter fastställandet av ett avtal mellan de inblandade företagen, eller i dess avsaknaden, åtminstone ett samordnat förfarande. EU-domstolen har antagit en flexibel tolkning av detta krav på samverkan. Utan den radikala åtgärden att ge algoritmer rättslig personlighet, är det dock svårt att föreställa sig hur autonomt beteende av algoritmer kan utgöra ett avtal. Följaktligen kan tillsynsmyndigheter få svårigheter att styrka en överträdelse i dessa fall.

I denna uppsats görs en djupgående genomgång av den nuvarande lagstiftningen, prejudikat från EU-domstolarna och den doktrin som har relevants för samordningsrekvisitet En central aspekt är EU-domstolens strävan att balansera konsumentintressen med företags självständighet att på ett effektivt sätt agera på marknaden. För detta ändamål har EU-domstolen utvecklat en mängd olika konkurrensrättsliga termer och presumtioner.

Anmärkningsvärt är att termer *dolus* och *culpa* dock lyser med sin frånvaro i diskussionerna kring algoritmers inverkan på konkurrensen. Denna avsaknad väcker frågor gällande relevansen av skuld inom konkurrensrätten. Då skuld sannolikt är svårt att stryka i en situation där konkurrensbegränsande avtal ingås autonomt av algoritmer, är syftet med uppsatsen att diskutera huruvida *dolus* och/eller *culpa* är ett nödvändigt rekvisit i den EU-rättsliga konkurrensrätten.

I en EU-rättslig analys av autonoma algoritmiska samordning, kommer denna uppsats tillämpa gällande rätt, samt modeller utvecklade i doktrinen. Därtill redogörs för kommentarer avseende algoritmers påverkan på konkurrensrätten i doktrinen.

Uppsatsen utmynnar i en ansats till att, utifrån gällande rätt, forma en modell för att hantera autonom algoritmisk samordning. Modellen utgår ifrån diskussionen om *dolus* och *culpa* och gör en analogi från det skadeståndsrättsliga konceptet av omsorgplikt (*duty to care*). Förhoppningen är att modell på ett effektivt sätt hanterar intressekonflikten mellan konsumentskydd och företags handlingsutrymme, samtidigt som den förhåller sig till gällande rätt.

Preface

As if yesterday, I remember my first steps on the cobblestones of Lund. Unsure about everything, not least about choosing law. Yet, here I stand, four and a half years later, concluding not only this thesis but my law studies. Never then could I have imagined the journey my studies would take me on. Many thanks are in order – many more than will fit here. However, here are the dearest ones.

Thanks to everyone who played a role during orientation, mentors, and fellow novices, helping me transform Lund into a place I call home.

Thanks to dormmates for making the time during the pandemic so much more than bearable.

Thanks to everyone involved in the Lund Student Carnival for making a genuinely unforgettable spring (and ruining my grades).

Thanks to all my Erasmus friends, those who helped with the thesis, and those who simply provided excellent company.

And thanks to everyone who help me along my studies – fellow students, professors, and others – in both Lund and Leuven. Though I may still harbour uncertainties about many things, I am confident that I have been given the most solid foundation for the next chapter in my life.

Lund, 3rd of January 2024,

Carl Brinnen

Abbreviations

AG	Advocate General
AI	Artificial Intelligence
Charter	The Charter of Fundamental Rights of the European Union
EC	European Commission
ECHR	European Convention on Human Rights
EU	European Union
GDPR	General Data Protection Regulation[1]
NCA	National Competition Authority
OECD	Organisation for Economic Co-operation and Development
TFEU	Treaty on the Functioning of the European Union

[1] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC

1 Introduction

1.1 Background

In today's society, algorithms are all around us. They decide which photos you see on social media, detect suspicious activity on your credit card and decide how much to charge for your next flight. For businesses, algorithms set prices, evaluate risks and sort through applicants. In short, AI and algorithms are not only expected to be a trillion-dollar industry,[2] but they are already an important decision maker in most consumers' lives.

The latest advances in AI and algorithms involve self-learning and so-called deep learning algorithms. The most advanced algorithms today are no longer directly programmed by humans. Instead, they developed their own logic, often in a manner incomprehensible for humans.[3] In many companies, these algorithms are now in charge of making a wide range of business decisions, including those that could be considered in violation of fair competition. For example, some airlines use algorithms to set individual ticket prices for each customer (pricing algorithms). A particular worry has arisen regarding the question of algorithms autonomously colluding.

An initial problem is with enforcement. Here, competition watchdogs are evidently worried. This can be seen by some new employees at competition authorities. Competition watchdogs across the globe have hired computer scientists to help in investigating competition violations involving algorithms.[4]

However, the harms AI and algorithms could cause for competition are plentiful, so-called *theories of harm*. Certain harms are so far theoretical and potential, others have already been realised, most recently highlighted in the *Google Shopping* case.[5] Belonging to the prior category of potential harms is autonomous algorithmic collusion, sometimes referred to as digital eye in literature.

Competition laws that, in one form or another, have been around since Roman times today stem from the adoption of the Sherman Act in 1890. The fundamental legislation of EU competition law has remained largely unchanged since the signing of the Treaty of Rome in 1956. Legal scholars now question

[2] Bloomberg Intelligence, "Generative AI to Become a $1.3 Trillion Market by 2032, Research Finds" (2023) Bloomberg, 1 June. Available at https://www.bloomberg.com/company/press/generative-ai-to-become-a-1-3-trillion-market-by-2032-research-finds/ [Accessed 30th December 2023]

[3] Cf. Ch. 2.

[4] See e.g. OECD (2023), Algorithmic Competition, OECD Competition Policy Roundtable Background Note, p. 33.

[5] C-48/22 P, *Google and Alphabet v Commission (Google Shopping)* [Pending]; T-612/17, *Google and Alphabet v Commission (Google Shopping),* ECLI:EU:T:2021:763.

whether the legislation is up to the task of monitoring competition in the digital age.

European competition law prohibits competition-distorting agreements. In a long list of cases, the Court of Justice and the General Court have developed a rather broad interpretation of the word agreement. Additionally, the jurisprudence of the Court of Justice has shown that EU competition law is certainly flexible.[6] Nonetheless, autonomous algorithmic collusion poses questions to the very core of competition law. How far can competition law bend before it breaks?

Earlier writers in the field believed that the lack of intent could, for self-learning autonomous algorithms, make them fall outside the scope of EU Competition law. However, how relevant are tort law/criminal law terminology such as intent? Is intent necessary to find an infringement? Would negligence be sufficient? Is neither necessary? This thesis aims to integrate the confrontation between EU competition law and autonomous algorithmic collusion into the mentioned terminology. Highlighting the subjective element of EU competition law along the way.

1.2 Literature Review

Research into AI began in the 1940s with mathematicians, psychologists, and computer scientists, among others, starting to theorise about the topic.[7] The field of AI was created in 1956 at the so-called Dartmouth Workshop, consisting of most of the leading thinkers at the time.[8] The development after that was dominated by attempts to make so-called *expert systems.*[9] In the mid-80s, the field returned to developing neuron networks and *machine learning*.[10] In the 2000s, the development of AI and machine learning have sped up rapidly thanks to *big data.*[11] The latest significant development in the field has been the emergence of *deep learning*.[12]

Research specifically into algorithmic collusion can be divided into two categories based on which aspect it focuses on technical/economic and legal.

[6] See further Ch. 3.

[7] Some notable works include, McCulloch, W. S. and Pitts, W., 'A Logical Calculus of the Ideas Immanent in Nervous Activity' (1943) 5 Bulletin of Mathematical Biophysics 115-137; Hebb, D. O. (1949). The organization of behavior; a neuropsychological theory. Wiley; Turing, Alan, 'Computing Machinery and Intelligence' (1950) LIX (236) Mind 433–460.

[8] See Russell, Stuart, & Norvig, Peter, Artificial Intelligence: A Modern Ap-proach (Fourth edition global edition, Pearson Education Limited 2022)

[9] A mechanism that connects several elemental reasoning steps to discover more comprehensive solutions. Russell, S J, & Norvig, P, p. 40.

[10] For more on *machine learning*, see Ch. 2.1.3; Russell, S J, & Norvig, P, pp. 42-44.

[11] The availability of extremely large datasets has been made possible by the emergence of the World Wide Web, alongside significant advancements in computing power, see Russell, S J, & Norvig, P, p. 44.

[12] See Ch. 2.1.4 LeCun, Yann, Bengio, Yoshua, and Hinton, Geoffrey E., 'Deep learning' (2015) 521 Nature, pp 436-444; Russell, S J, & Norvig, P, p. 35.

Legal writings on algorithmic competition have been primarily centred around the works of Ezrachi and Stucke.[13] They, among many other authors, have written on the harm of algorithmic collusion on a general basis and of general competition/anti-trust law principles.[14] Other scholars have written on the implications for specific jurisdictions, for EU competition law, notable contributions have been made by Blockx[15], Van Cleynenbreugel[16] and Calzolari[17]. There is further a discussion on the implementation of new regulatory instruments.[18] Writing on the technical aspects, there have been contributions from legal scholars', but also economists and computer scientists.[19]

Another leading contributor in the field of algorithmic collusion has been the OECD. In 2017, they held a roundtable discussion titled "Algorithms and Collusion".[20] Although some research had been done on the topic beforehand,[21] the roundtable was the start of large-scale research on algorithmic collusion, since OECD initiative multiple competition watchdogs have

[13] See among other Ezrachi, Ariel, and Maurice E. Stucke, Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy (Harvard University Press, Cambridge, MA and London, England, 2016a); Ezrachi, Ariel, and Maurice E Stucke, "Artificial intelligence & collusion: When computers inhibit competition" (2017a) U. Ill. L. Rev. 1775.); Ezrachi, Ariel, and Maurice E Stucke, "Two artificial neural networks meet in an online hub and change the future (of competition, market dynamics and society)" (2017b); Stucke, Maurice E, and Ariel Ezrachi, "How pricing bots could form cartels and make things more expensive" (2016b) Harvard Business Review 27.

[14] See among others, Calvano, Emilio, Giacomo Calzolari, Vincenzo Denicolò, and Sergio Pastorello, "Artificial Intelligence, Algorithmic Pricing, and Collusion" (2020) 110 American Economic Review 3267-97); Schwalbe, Ulrich, "Algorithms, Machine Learning, and Collusion" (June 1, 2018).

[15] See among other, Blockx, Jan, "Antitrust in Digital Markets in the EU: Policing Price Bots" (June 2, 2017) Radboud Economic Law Conference 9 June 2017; Blockx, Jan, "Antitrust in Digital Markets in the EU: Policing Price Bots" in Digital Markets in the EU (Wolf Legal Publishers, 2018) 75-89.

[16] See Van Cleynenbreugel, Pieter, "Article 101 TFEU's Association of Undertakings Notion and Its Surprising Potential to Help Distinguish Acceptable from Unacceptable Algorithmic Collusion" (2020) 65(3) The Antitrust Bulletin 423-444.

[17] See Calzolari, L., "The Misleading Consequences of Comparing Algorithmic and Tacit Collusion: Tackling Algorithmic Concerted Practices Under Art. 101 TFEU" (2021) 6(2) European Papers: A Journal on Law and Integration 1193-1228.

[18] See among others, Tsoukalas, Vasileios, "Should the New Competition Tool be Put Back on the Table to Remedy Algorithmic Tacit Collusion? A Comparative Analysis of the Possibilities under the Current Framework and under the NCT, Drawing on the UK Experience" (2022) 13(3) Journal of European Competition Law & Practice 234–248; Hawkes, Colm, "A Market Investigation Tool to Tackle Algorithmic Tacit Collusion: An Approach for the (near) Future" (2021) College of Europe.

[19] See among others, Hettich, Matthias, 'Algorithmic Collusion: Insights from Deep Learning' (24 November 2021); Klein, T., "Autonomous algorithmic collusion: Q-learning under sequential pricing" (2021) 52 The RAND Journal of Economics 538-558; Gal, Michal, "Algorithms as Illegal Agreements" (May 2, 2018) Berkeley Technology Law Journal, Forthcoming; Abada, Ibrahim, and Xavier Lambin, "Artificial intelligence: Can seemingly collusive outcomes be avoided?" (2023) Management Science.

[20] OECD (2017), Algorithms and Collusion: Competition Policy in the Digital Age www.oecd.org/competition/algorithms-collusion-competition-policy-in-the-digital-age.htm

[21] See among others: Capobianco, A., & Gonzaga, P., "Algorithms and competition: Friends or foes" (2017) 1(2) Competition Policy International.

written reports and position papers, including the competition authorities in: Denmark[22], Norway[23], Sweden[24], the Netherlands[25], and a joint paper by France and Germany[26]. In June this year [2023], the OECD hosted another roundtable discussion, now titled "Algorithmic competition", building the research conducted during this period.[27]

The chief area of study has been so-called differentiated pricing. This is understandable considering the recent high-profile cases on the topic; notable cases include Google Shopping[28] and, *Amazon Marketplace and Buy Box*[29]. However, these cases regard the abuse of a dominant position under art. 102 TFEU and therefore fall outside the scope of this thesis.

Within the scope of art. 101 TFEU, a lot of research have gone into how algorithms may make the formation and upkeep of cartels easier.[30] Related to this, a major focus of the previously mentioned national reports has been on how to conduct investigations into algorithms.[31] Multiple of the national reports and some other researchers have also conducted studies on the

[22] Danish Competition and Consumer Authority (2021), "Prisalgoritmer - og deres betydning for konkurrencen" (Princing algorithms - and their significance for competition), https://www.kfst.dk/media/yecpmmxu/prisalgoritmer.pdf [Accessed 1st Januari 2024]. [In Danish]

[23] Konkurransetilsynet "Hvilken effekt kan algoritmer ha på konkurransen?" (2021) https://konkurransetilsynet.no/wp-content/uploads/2021/02/Konkurransetilsynet_algoritmerapport_2021.pdf [Accessed 1st Januari 2024] [In Norwegian]; English translation available for main parts: Norwegian Competition Authority (2021), What effect can algorithms have on competition? The Norwegian Competition Authority's market survey on the use of monitoring and pricing algorithms, https://konkurransetilsynet.no/wp-content/uploads/2021/03/Report-Algorithms-english-version-2021.pdf [Accessed 1st Januari 2024].

[24] Swedish Competition Authority (2021), "Collusion in Algorithmic Pricing", https://www.konkurrensverket.se/globalassets/dokument/informationsmaterial/rapporter-och-broschyrer/uppdragsforskning/forsk-rapport_2021-3.pdf [Accessed 1st Januari 2024].

[25] Authority for Consumers and Markets (2019), "Naleving van de Mededingingswet" (Compliance with the Competition Act), https://www.acm.nl/sites/default/files/documents/2019-09/rapportage-naleving-van-de-mededingingswet.pdf. [Accessed 1st Januari 2024]

[26] Autorité de la concurrence & Bundeskartellamt (2019), "Algorithms and Competition", https://www.autoritedelaconcurrence.fr/sites/default/files/algorithms-and-competition.pdf. [Accessed 1st Januari 2024]

[27] OECD (2023)

[28] T-612/17 - Google and Alphabet v Commission (*Google Shopping*)

[29] Case COMP/AT.40462 and Case COMP/AT.40703 – Amazon Buy Box [2022]

[30] Ulrich (2018); Kühn, Kai-Uwe, and Steve Tadelis, "The economics of algorithmic pricing: Is collusion really inevitable" (2018) Work; Gautier, Axel, Ashwin Ittoo, and Pieter Van Cleynenbreugel, "AI algorithms, price discrimination and collusion: a technological, economic and legal perspective" (2020) 50(3) European Journal of Law and Economics 405-435.

[31] See also, Harrington, Joseph E, "Developing Competition Law for Collusion by Autonomous Artificial Agents" (2018) 14(3) Journal of Competition Law & Economics 331–363; Wieting, Marcel and Sapi, Geza, "Algorithms in the Marketplace: An Empirical Analysis of Automated Pricing in E-Commerce" (September 30, 2021) NET Institute Working Paper No. 21-06.

feasibility of algorithmic collusion.[32] More recently, some scholars have published articles on autonomous algorithmic collusion.[33]

Although there have to date not been any cases before the Court of Justice on autonomous algorithmic collusion, there is a long line of caselaw developing the concepts of agreement, decision of association of undertakings and concerted practices. There is also no shortage of doctrine for EU competition law.[34]

1.3 Purpose and Research Questions

With due consideration of the literature review, certain gaps and disregarded perspectives can be identified.

1.3.1 Purpose

First, few authors have gone through the effort to offer a comprehensive overview of the existing jurisprudence to grasp why already developed concepts are suited or ill-suited to deal with autonomous algorithmic collusion. Hence, this is a gap this thesis aims to fill: thoroughly going through the existing caselaw and attempting to apply it to autonomous algorithmic collusion.

Second, there have been few deliberations regarding a hybrid scenario, that is, where collusion is achieved by a mix of humans and autonomous algorithms; for the purposes of this thesis, let's call it "cyborg-collusion". This thesis will attempt to analyse that scenario and its implications for EU competition law.

Third, the original concept of harm posed regarding the lack of intent has, to a large extent, been, in the author's view, unreasonably swiftly dismissed. This thesis will analyse existing legislation, case law and doctrine by applying this tort/criminal law terminology. Ultimately, the thesis will attempt to use this terminology to formulate a model for dealing with autonomous algorithmic collusion.

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[32] Cf Swedish Competition Authority (2021); Calvano et al (2020); Dorner, Florian E., 'Algorithmic Collusion: A Critical Review' (2021); Werner, Tobias, "Algorithmic and Human Collusion" (2023).

[33] Klein (2021); Assad, S., Calvano, E., Calzolari, G., Clark, R., Denicolò, V., Ershov, D., Johnson, J., Pastorello, S., Rhodes, A., Xu, L., & Wildenbeest, M., 'Autonomous Algorithmic Collusion: Economic Research and Policy Implications' (2021) 37(3) Oxford Review of Economic Policy 459-478; Van Uytsel, Steven, 'The Algorithmic Collusion Debate: A Focus on (Autonomous) Tacit Collusion' in Algorithms, Collusion and Competition Law (Edward Elgar Publishing, 2023) 1-38.

[34] This thesis has mainly relied upon, Whish, R., & Bailey, D., *Competition Law* (Tenth edition, Oxford University Press, 2021); Lianos, I., Korah, V., & Siciliani, P., *Competition Law* (First edition, Oxford University Press, 2019); Ezrachi, A., *EU Competition Law: An Analytical Guide to the Leading Cases* (Seventh edition, Hart).

1.3.2 Research Questions

Based on the stated purpose, certain main themes and accompanying research questions can be formulated:

- What are the key relevant concepts and principles in existing jurisprudence and legal doctrine (see Chapter 3)?

- To what extent can the existing legal concepts be applied to autonomous algorithmic collusion? In particular, does autonomous algorithmic collusion fall within the scope of art 101 (see Chapter 5)?

- Can the tort/criminal terminology regarding fault be applied in a meaningful way to EU competition law? Ultimately, is it possible to formulate a model based on the tort/criminal terminology on fault? (see chapter 4, revisited in chapter 5.4)

1.4 Scope and limitations

As previously stated, this thesis will focus on autonomous algorithms collusion and its relationship with art. 101 TFEU. The emphasis is on the legal analysis. Nevertheless, some economic and technical analysis is incorporated to frame the legal discussion.

Other areas of the large field of algorithmic collusion will also be discussed in pursuance of answering the first research question. However, the legal analysis on these topics will be kept to a minimum.

EU competition regulations are the main focal point of this study. Due to the nature of EU competition law, the legislation, caselaw and doctrine of the member states also hold some relevance and will be discussed when appropriate. Other areas of EU law will also be mentioned where required, notably the GDPR. Similarly, other jurisdictions may also be mentioned; the legal relevance is, of course, limited to the rationale of the arguments. Questions on the effects of algorithms on national law, other fields of EU law and other jurisdictions will not be considered.

Further, the scope of this thesis is limited to art. 101 TFEU. Although plenty of interesting legal issues arise from algorithms and other fields of EU competition law, such as *personal pricing* and digital marketplaces as essential facilities under art. 102 TFEU and the Digital Market Act, as well as due diligence for mergers of companies controlling algorithms under the EU Merger Regulation,[35] these topic fall outside the scope of this thesis.

[35] Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings

1.5 Methodology & Material

1.5.1 Research Objectives

As seen from the research questions above, this thesis aims to achieve various things. These various aims can be classified into three different categories of research objectives.

The first research question holds a descriptive research objective in summarising and reviewing the current legislation but, perhaps more signifyingly, the caselaw and doctrine.[36]

The second question contains an evaluative research objective. The aim of which is to find out how the law deals with this new challenge that is algorithmic collusion.[37]

The third research question encompasses a theory-building objective. For the fourth research question, it is largely about testing the feasibility of an existing framework of legal terminology, while the fifth question involves developing a new model.[38]

Lastly, it should be noted that, while not part of any of the research questions, a recommendatory objective is, to some extent, prevalent in this thesis. Suggested approaches for dealing with algorithms are summarised in Chapter 6.3. Additionally, although building upon existing caselaw and doctrine as well as being a faithful interpretation of these as it stands, the final model, that is the fifth research question is to an extent *de lege ferenda.* This is because it is one of many possible ways to interpret the existing legal sources.

1.5.2 Methodology

In a general sense, the legal dogmatic method and classical EU legal theory will be used in the analysis of the research questions. Considering this thesis holds three different categories of research questions, it will rely on a few different types of legal methodology. Initially, relevant legislation, caselaw and extracts from scholarly writings will be presented in evaluating these sources, as a first step a grammatical/technical interpretation is used. However, since by its nature, EU competition law contains few statutory provisions, an interpretation based on jurisprudence is the most used methodology in this thesis. This is further, at times, complemented by a systematic method of interpretation. Additionally, interpretations based on doctrine and so-called soft law, such as commission guidelines, are also used. To a lesser extent, a

[36] Kestemont, L., *Handbook on Legal Methodology: From Objective to Method* (Intersentia, 2018), pp. 9-11.
[37] Ibid, p. 17.
[38] Ibid, 14-15.

legal-historical, comparative, and teleological method of interpretation is used.[39]

In the evaluation of the situation posed, this thesis uses an internal approach, that is, with sources familiar with the legal system. Hence, besides the always present principles for evaluation, such as internal consistency and equality, the main evaluating criterion for this thesis is (1) the extent of retained freedom of market players to intelligently enact market strategies, (2) the effective enforcement of competition law and (3) legal certainty.

Regarding the theory-building objective, the thesis does this by putting this thesis into the framework of famous German legal schooler Dreier; it would be classified as a principle-based theory (Ge. "Prinzipientheorie") while also containing elements of a gap-filling ("Lückenfüllende") and conceptual theory ("Grundbegriffstheorien").[40] The theory essentially relies on five interests, the reasons for why these five are important should hopefully become apparent thought-out this thesis. Relevant interests are besides (1)-(3) above, also (4) the limiting of harm caused by algorithmic collusion, and (5) the retainment of the benefits provided by algorithms for consumers. Ultimately, these interests have a significant degree of overlap but provide, together, a principal baseline for the construction of a model.

1.5.3 Material

As follows naturally follows from the usage of the legal dogmatic method, legislation, both primary and secondary EU law and caselaw make out the fundamental basis for this thesis. These sources have binding powers within the Union. Furthermore, soft law, such as Commission guidelines and legal doctrine, will be used to complement the binding sources. Some notes on these sources are warranted.

The caselaw used in this thesis is that of the CJEU, hence both from the Court of Justice and from the General Court. The binding force of judgements from the General Court is not entirely certain. Some authors have noted that the Court of Justice has refrained from calling judgements from the General Court as precedents.[41] However, the Court has acknowledged that the judgements have such effect.[42] For the purposes of this thesis, the General Court's decisions will be treated as presidents unless they have been overruled.

Furthermore, some references are made to the opinions of advocate generals. These hold little legally binding force in themselves; in such cases, they may

[39] Kestemont (2018), pp. 21-31.

[40] Dreier, R., *Recht – Moral – Ideologie* (Suhrkamp, Frankfurt am Main, 1981), pp. 73-77 [In German]; Summarized in English in Kestemont, p. 55.

[41] On this see John J. Barcel, 'Precedent in European Community Law' in D. Neil McCormick et al. (eds), Interpreting Precedent (1997) 407, 417.

[42] Case C-197/09 RX-ll, M v. EMEA, ECLI:EU:C:2009:804, para. 62; Case C-334/12 RX-ll, Jaramillo et al. v. EIB, ECLI:EU:C:2013:134, para. 50.

provide a greater understanding of the judgment in question. However, the Court may have referred to them in their decision. Opinions are to be treated as legal doctrine.

Continuing, some references are made to commission decisions. These are not binding precedents, not even for the Commission itself. In spite of this, it is suggestive of at least the Commission's further conduct. Otherwise, it only holds value in the strength of the arguments themselves. Other documents from the Commission, such as guidelines, are considered soft law. Similarly, these do not hold any binding force for the CJEU due to the hierarchy of norms. Contrary to decisions, they are nevertheless binding upon the Commission.[43]

1.6 Terminology

To begin with, let's discuss the terminology that will be used throughout this thesis. For the most part, these terms lack an unilaterally accepted definition. Where needed, a definition from a reputable source will serve as the basis for the thesis. However, the terms will be discussed more generally to explore the meaning of the terms from different perspectives.

1.6.1 Algorithm

An algorithm can be anything from a simple math equation to the most complicated AI to date. At its core, algorithms are sets of instructions that, given certain inputs, produce a certain outcome.

A universally accepted definition has not been adopted, and different sources on the topic use different definitions. The OECD has generally adopted a definition coined by Wilson and Keil, and goes as follows:

> An algorithm is an unambiguous, precise list of simple operations applied mechanically and systematically to a set of tokens or objects (e.g., configurations of chess pieces, numbers, cake ingredients, etc.). The initial state of the tokens is the input; the final state is the output.[44]

Notably, the French (Autorité de la concurrence) and the German (Bundeskartellemt) competition authorities use a narrower definition, limiting their definition of the field of computer science and adopting a definition by Cormen, Leiserson, Rivest & Stein.[45]

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[43] See C-148/73, Louwage v Commission, EU:C:1974:7, para 12.

[44] Seen in OECD (2017); Originally from Wilson, R. and F. Keil, The MIT Encyclopedia of the Cognitive Sciences (MIT Press, 1999).

[45] Autorité de la concurrence & Bundeskartellemt "Algorithms and Competition (2019), https://www.autoritedelaconcurrence.fr/sites/default/files/algorithms-and-competition.pdf [Accessed 1st Januari 2024]; Cormen, T H, Leiserson, C E, Rivest, R L, & Stein, C, Introduction to Algorithms (Fourth edition, MIT Press, 2022), p. 5.

For the purposes of this paper, the precise definition of an algorithm is of no major importance. Any of the mentioned definitions would suffice. This is due to algorithms being a broad catch-all term. Even with the narrower French-German report, there is never any discussion of any operation falling outside the definition of algorithm. For these reasons, the paper will rely on the OECD's definition. However, note that this choice is rather arbitrary and has no relevant consequences for the legal discussion.

Further, for the purposes of the paper, no distinction will be made between a single algorithm and multiple algorithms used by the same company for the same objective, e.g., setting the optimise prize. In actuality, a company might use one algorithm for collecting prices from competitors, one for calculating operative costs, etc. and then finally one algorithm utilising these inputs in order to set an optimised price. In such a case, this paper will view them all as the same algorithm. However, if a company, through an algorithm(s), only performs one of these operations, e.g., monitoring competitors' prices, such an algorithm will be different from an algorithm that performs the final decision (pricing algorithm).

1.6.2 Artificial Intelligence (AI)

Artificial intelligence (AI) also lacks an ultimate definition. Among the first and most famous definition of AI was suggested by Alan Turing and the so-called Turing-test. Whereby if you place your AI behind a visual barrier and, after talking to it, you cannot tell if it is human or artificial, then it's an AI.[46] Another famous definition is that of John McCarthy, who describes AI as "the science and engineering of making intelligent machines."[47] In recent times, there has been a shift in emphasis, moving from the endeavour to create AI that simulates human-like behaviour to the pursuit of AI that demonstrates rationality. Furthermore, this shift extends to developing AI that strikes a balance between rationality and adaptability, making it a valuable asset in our occasionally irrational real-world contexts.[48]

Many other definitions have been suggested in literature since then. AI, at least outside of academia, simultaneously the science, technology, and final

[46] Discussed in: Turing, A. M., 'Intelligent Machinery' in Machine Intelligence 7, eds. B. Meltzer and D. Michie (1969); Turing (1950); Turing, A. M., 'Can a Machine Think' in The World of Mathematics, ed. James R Newman, vol. 4 (1956), p. 2099-2133, Simon & Schuster.

[47] McCarthy, J., 'What is Artificial Intelligence?' (1998), p. available at https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edscog&AN=edscog.412&site=eds-live&scope=site [accessed 1 January 2024].

[48] Russell, S. J., & Norvig, P. (2022). Artificial Intelligence: A Modern Approach (Fourth edition global edition). Pearson Education Limited. (pp. 19-23).

product of appeared non-human intelligent. Dobrev, in his paper, expands on the difficulties of defining AI and suggests his refined definition.[49]

In the opinion of this paper, the term AI is too broad to be useful. Therefore, this paper will, to the extent possible, avoid using the term. That is not to say that the concepts discussed in this paper fall outside the scope of AI. However, the term does not describe anything that is not already captured by other more precise terms. While when a need for a broad term arises, the term algorithm will be used.

1.6.3 Machine Learning

Machine learning is the process of machine learning without being explicitly programmed to do the specific task at hand.[50] It can be classified as a subfield of AI. Advanced algorithms such as ChatGPT, image recognition, self-driving cars, etc., all utilise machine learning. They are to be differentiated from classical algorithms/AI that are essentially advanced flowcharts.

Machine learning itself is divided into subsections. Various sources use various ways to differentiate different types of machine learning. Regardless, the common way is that of Anitha et al., who classified machine learning into three categories.[51] These are supervised learning, unsupervised learning, and reinforced learning.

Supervised learning is a way to teach computers by providing them with examples with known answers, so-called labelled data, e.g., an image-recognition algorithm is shown an image of a banana labelled with the word "banana". From the labels an algorithm being trained with supervised learning, then tries to generalise the pattern to eventually being able to, itself, label an unlabelled picture. It's widely used in applications like image recognition, spam email filtering, and more, where data with known outcomes are available and want to automate decision-making based on that data.[52]

Unsupervised learning is similarly taught on a set of training data, but the data is unlabelled. The algorithm seeks patterns, relationships and groupings

[49] Dobrev, Dimiter, 'A Definition of Artificial Intelligence' (arXiv preprint arXiv:1210.1568, 2012).

[50] Samuel, A. L., 'Some Studies in Machine Learning Using the Game of Checkers' (1959) IBM Journal of Research and Development, available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.368.2254&rep=rep1&type=pdf. [Accessed 1st January 2024]

[51] Anitha, P., G. Krithka and M. D. Choudhry, "Collusion between Algorithms: a literature review and limits to enforcement" (2014), International Journal of Advanced Research in Computer Engineering & Technology, Vol. 3, No. 12, pp. 4324-4331.

[52] Russell & Norvig 2022, pp. 689-671. For further reading see pp. 671-738, esp pp 671-675 & 694-704.

within the dataset. Unsupervised learning is used for, among other things, customer segmentation, anomaly detection, and data compression.[53]

Some algorithms utilise a combination of supervised- and unsupervised learning, this method is called *semi-supervised learning*.[54]

Reinforced learning is a more dynamic learning system in which the algorithm learns effectively by trial and error. An algorithm starts by, almost randomly, guessing the solution to the problem. If correct, the algorithm is given a "reward." by repeating this process time and time again, the algorithm eventually learns to improve the accuracy with which it solves the problem. An example would be chess bots; previously, the chess bots were trained by studying millions of games by grandmasters (supervised learning); these bots eventually lost out to bots that were taught by playing themselves trillions of times and being rewarded for checkmating the opponent. Except for chess bots and other bots in various games, reinforcement learning is also used for autonomous robotics and recommendation systems.[55]

1.6.4 Deep Learning

A common denominator for the previously listed types of machine learning is that they all require feature extraction, the process of converting real-life information into zeros and one, interruptible by an algorithm.[56] Deep learning algorithms forgo this step. They utilise a technique called neuron networks that was originally inspired by the functioning of the human brain. The term "deep" refers to the usage of multiple "layers". Each layer consisting of neutrons holding a value and each neutron being connected with a link that can be variously strong.[57]

Imagine the aim is to interpret a handwritten single-digit number. The first layer (input layer) would then be the image itself, represented by multiple neutrons, based on which parts of the image are shaded and which aren't. The neutrons in the first layer then activate the second layer. What does the second layer do? In actuality, we do not know, but for the sake of this explanation, let's imagine it holds neutrons representing different smaller patterns, e.g., a horizontal in the upper part of the image or a diagonal line going from left to right. In turn, the next layer is activated; again, we do not know how what happens, but perhaps it recognises patterns within the previous layers, such

[53] See Russell & Norvig, pp. 689-671 & 788-789. For further reading see pp. 788-798.
[54] Ibid, p. 723.
[55] See Russell, S. J., & Norvig. pp. 840-842. For further reading see pp. 840-873.
[56] Ibid, pp. 988-989.
[57] Ibid, p. 801. For further reading see pp. 801-835.

that a horizontal line plus a diagonal line equals an image of a seven. In this case, the algorithm produces the outcome "seven".[58]

All layers between the first (input) and the last (output) are called hidden layers. The number of layers, number of neurons, and, subsequently, the number of links vary between algorithms, but it is a choice for the programmer. However, what each neuron, link and layer does and represents is, to a large extent, unknowable, even to the programmer. Depending on the choice of teaching method, it is instead fine-tuned by the algorithm itself by altering the strengths of the links and neurons.

1.6.5 Black Box

The term Black box is employed to characterise the enigmatic facets of algorithms that elude human comprehension. Although programmers know inputs and can observe the output, the intricate processes transpiring within the algorithm remain incomprehensible – that is what is within the black box.

To link back to deep learning, the term black box refers to the hidden layers, the part of the process incomprehensible to humans; hence, it was instead necessary to imagine for the sake of the explanation. In reality, for a simple algorithm like the one used in the above example, there are techniques to figure out the inner workings. However, it generally holds that algorithms taught with deep learning are not entirely understandable for humans. Similarly to our understanding of the human brain, we are able to understand what single neurons or links do, but the sum is too complex to grasp.

1.7 Outline

The present study is organised into six chapters. This chapter, chapter one, has introduced the research topic and framed the research questions, which will be addressed throughout the thesis.

Chapter two develops the background further. It will review the underlying economics and technical capabilities which create the threat of algorithmic collusion. Finally, the chapter concludes with an examination of the feasibility of algorithmic collusion.

Chapter three presents the existing EU legal framework, including regulations, caselaw and traditional doctrine.

[58] This example was inspired by: 3Blue1Brown (2017) 'But what is a neural network? | Chapter 1, Deep learning' [Video], YouTube https://www.youtube.com/watch?v=aircAruvnKk accessed 26 December 2023.

Chapter four initiates the development of a model based on *dolus/culpa* and analyses how well such terminology fits into the framework of EU Competition law.

Chapter five discusses the digital eye scenario from various perspectives. Initially, a traditional legal formal approach will be used. This is further complemented by theoretical approaches suggested in literature and by other scholars' contributions. The chapter revisits and completes the model from chapter four.

Chapter six discusses the interests at play, revisits the original research questions, and ultimately concludes.

2 Harms of Algorithmic Collusion

2.1 Theories of harm

Determining precisely what potential harm advanced algorithms could cause is a severely challenging task. There will always be uncertainty regarding how tomorrow's technology and markets will function. Multiple sources have regardless attempted to categorise these different potential harms. For this thesis, Ezrachi's and Stucke's categorisation will be used.[59] However, this is not the only categorisation there is, nor is it an exhaustive list of potential harms. Another notable categorisation is by the OECD, most of all other sources refer to one of these two.[60] The differences are minor. In the following, Ezrachi's and Stucke's categories will be expanded upon individually, both in their meaning and potential threat to competition.

2.1.1 Messenger

The main characteristic of the "messenger"-algorithm is that it relies upon human intent; algorithms are used to communicate within a cartel. Hence, this poses no real issues in terms of applying the current legislation. Nevertheless, it may amount to serious problems in proving and enforcing competition law.

2.1.2 Hub-and-Spoke

Hub-and-spoke cartels are not a completely new concept for EU Competition law.[61] The concept, in general, refers to a situation where an upstream supplier, by means of vertical agreements, creates an anti-competitive on a downstream market. Effectively, they organise their consumers into a cartel without the need for a horizontal agreement between them. An example would be for a distributor to set a minimum price for its suppliers.[62]

The theory for hub-and-spoke cartels within the realm of algorithmic collusion is that collusion could organised by companies outsourcing the development of their algorithms to an external company (the hub). If multiple companies on the same market all outsource the development, the hub could organise for a collusive outcome on the downstream market.

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[59] See Ezrachi & Stucke April 8, 2015; Ezrachi & Stucke (2016a).

[60] See OECD (2017).

[61] Belgian Competition Authority, Prosecutor's Office, Decision No. ABC-2015-I/O-19-AUD of 22 June 2015, Case CONC-I/O-06/0038 [Belgium] [In French]; Decision of the Office of Fair Trading, CA98/03/2011, Dairy Retail Price Initiatives, 26 July 2011, Case CE/3094-03. [United Kingdom]; Dutch Competition Authority, British American Tobacco International / JT International Company Netherlands / Philip Morris / Van Nelle Tabak Nederland, ACM/19/035337, 27 May 2020 [Netherland] [In Dutch].

[62] This example is only to illustrate the concept, in a real case, a minimum price is forbidden in vertical agreements, see art. 4 (a) Commission Regulation (EU) 2022/720 of 10 May 2022 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of vertical agreements and concerted practices (VBER).

Similar to the messenger model, the hub-and-spoke model poses few problems for the application of current legislation but may create difficulties with evidence and enforcement.

2.1.3 Predictable Agent

Algorithms as predicable agents, means that undertakings unilaterally create algorithms that purposely react to changing markets in a predictable manner. If the undertaking's competitor also develops similar algorithms, a parallelism in market behaviour may arise without any communication between the competitors. In such a scenario, it will be burdensome to both fit this under the current legislation and to prove the existence of an agreement/concerted practice.

2.1.4 Digital Eye

A Digital Eye algorithm, similar, to the predictable agent, is unilaterally programmed by an undertaking. However, instead of being programmed to act in a certain, predictable manner, it is programmed to, as efficiently as possible, achieve a certain goal, e.g. maximise profits. This is achieved by some type of self-learning. Hence, the algorithms execute whichever strategy they find suitable; they may reach the conclusion that the most efficient way is to, in one way or another, collude.

This is the core issue for this thesis, and the implications of such a scenario will be explored throughout the thesis. Due to the extra emphasis, let's explore this scenario in further detail. It may pose a challenge to conceptualise the manner in which algorithms designed for a highly specific function, e.g. price setting, could engage in collusion with another algorithm, especially if they lack the capability to communicate directly. In order to illustrate, the game theory concept of the *Prisoners' dilemma* is helpful.

The *Prisoners' Dilemma* represents a scenario in which individual players face dominant incentives, leading them to choose strategies that result in a collectively less desirable outcome unless there is no enforceable agreement to the contrary. In this classic game theory setup, two prisoners, interrogated separately, must decide whether to confess to a moderate crime they committed together or accuse each other of a more severe offence. The dilemma arises as the accuser can go free unless they are accused, while the accused face heavy sentences. Game theory initially suggests that the prisoners should choose to accuse each other. However, if the game is repeated and the prisoners anticipate potential retaliation, the optimal strategy shifts to both confessing.

Now, extending this concept to algorithms, a parallel can be drawn. Similar to the prisoners, algorithms lack direct communication. In an iterated Prisoners' Dilemma scenario, algorithms might strive for a cooperative outcome. For instance, pricing algorithms could attempt to undercut a competitor's

prices, but this carries the risk of retaliation. If the competing algorithm also responds by lowering prices, both parties end up with lower profit margins.

On the other hand, an algorithm could choose to price-match, maximising profits but potentially harming consumers. This tacit collusion, often known as price signalling, is comparable to human behaviour. However, the challenge lies in detecting algorithmic price signalling, as the "Black box problem" implies that algorithms may use such strategies in ways that are undiscovered or even unrecognisable by humans. For a more in-depth exploration of the mathematical aspects of this topic, Mehra provides a comprehensive overview.[63]

2.2 Economics of Algorithmic Collusion

2.2.1 The Dubble-edged Sword of Market Transparency

A high degree of transparency has traditionally been associated with a well-functioning market to the benefit of consumers. It allows consumers to make well-informed decisions for their purchasing. Consider the concept of perfect competition. For instance, transparency or “perfect information” is considered a requirement.[64] Today’s digital economy has significantly boosted market transparency. Contrary to the brick-and-mortar economy, prices can be checked and compared within seconds and are even further helped by price comparison websites. In itself, this is, of course, beneficial for consumers.

At the same time, prices in the digital economy can also be updated a lot quicker than in the brick-and-mortar economy. These two factors, market transparency and frequency of interactions (price changes), are regarded within economic research to facilitate collusion.[65] In short, the reasons for this are that with high market transparency, it is easier to monitor whether fellow cartelists stick to the collusive understanding. Further, with a higher frequency of interactions, deviating cartelists can be punished quicker and more efficiently, in turn lessening the incentive to deviate.

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[63] See Mehra, Salil K., 'Price Discrimination-Driven Algorithmic Collusion: Platforms for Dura-ble Cartels' (September 24, 2020), Stanford Journal of Law, Business, and Finance, Forth-coming, Temple University Legal Studies Research Paper No. 2020-35.

[64] See Robinson, J., 'What is Perfect Competition?' (1934) The Quarterly Journal of Economics 49(1), 104–120. With reference to: Knight, F. H., *Risk, Uncertainty, and Profit* (Repr., Houghton Mifflin, 1921).

[65] Stigler, G. J., 'A Theory of Oligopoly' (1964) Journal of Political Economy 72(1), 44-61; Jacquemin, A., and M. E. Slade, 'Cartels, Collusion, and Horizontal Merger' in R. Schmalensee and R. Willig (Eds.), Handbook of Industrial Organization, Vol. 1, Chapter 7, p 415-473, Elsevier (1989), available at http://home.uchicago.edu/~vlima/courses/econ201/Stigler.pdf; Ivaldi, M., B. Jullien, P. Rey, P. Seabright, and J. Tirole, 'The Economics of Tacit Collusion' (2003), Final Report for DG Competition, European Commission, pp. 19-26; Levenstein, M. C., & Suslow, V. Y., 'What Determines Cartel Success?' (2006) Journal of Economic Literature 44(1), 43–95, available at http://www.jstor.org/stable/30032296.

2.2.2 Reduction of Uncertainty

The previously mentioned factors of transparency and frequency of interactions are sorted into the broader contributors to the reduction of uncertainty. Beyond what has already been mentioned for the digital economy, algorithms facilitate collusion by limiting uncertainty and reducing the risk of misinterpretation. Consider this slightly modified scenario from *Ezrachi and Stucke:*

> German manufacturer (GM), reach an understanding with French manufacturer (FM) to each supply their own domestic market. One of GMs distributers, sell GMs product to a French retailer, without either GMs or FMs knowledge. FM find GMs product on the French market.[66]

In this case, there is a significant risk that FM, assuming GM have deserted the arrangement, will retaliate. In turn, GM, seeing FM's dissertation, will also retaliate, at which point the cartel has collapsed. Although, FM, in theory, can contact GM in an attempt to mitigate the situation, is this difficult for a number of reasons. First, if GM indeed intended to cheat the agreement, GM has very few incentives to truthfully inform FM of its future conduct. Second, time is of the essence; if FM is to retaliate, the manufacturers will go back to being competitors, and stalling could give GM a favourable market position. Third, contact between competitors could alert competition watchdogs to the illegal arrangement. *Ezrachi and Stucke* refer to this as the "tit-for-tat death spiral".[67]

Algorithms have several advantages in this situation. Initially, algorithms could be programmed, or have learned, to retaliate only after a certain threshold is reached, e.g., after a certain quantity of products have been sold on its own market. Further, algorithms may be able to "communicate" more discretely. However, perhaps most significantly, the increasing amount of data available by using algorithms and the increased capabilities of tracking said data make misconceptions less likely. Especially if GE and FE mutually share relevant data, e.g. FE can track all of GE's deliveries. By analysing patterns in the delivery data, FE's algorithm could potentially deduct that this is a one of mistake, hence retaliation is avoided.

2.2.3 Artificial Algorithmic Assurance

Cartels rely on mutual trust among their members to operate. Even in situations where compliance with the anti-competitive agreements is the economically rational decision, do cartels run the risk that an involved person feels guilt and pulls out of the agreement, or worse, reports it to the authorities. Competition authorities use various measures to break this trust, most famously leniency programs. The reliance on trust limits the size of the cartel.

[66] Cf. Ezrachi & Stucke (2016a), p. 75.
[67] Ibid, pp. 74-76

It is easier to trust five companies than fifty; it is easier to monitor the conduct of five than fifty.

Algorithms do not trust, nor do they distrust. Instead, algorithms rely on probability and logic. Cartels are stable until incentives change or at least appear to have changed. In brick-and-mortar cartels, incentives are hard to gauge. In digital cartels, especially in a digital eye scenario, where undertakings have extensive access to the other cartelists' data, incentives can be approximated a lot more accurately. Additionally, mutual reliance on algorithms lessens the incentive to defect further since it mutually assures economically rational decision-making; in other words, rational behaviour triggers rational behaviour and vice versa.[68]

2.3 A Note on Feasibility of Digital Eye

While, messenger and hub-and-spoke algorithms have already been observed in real market conditions,[69] whether digital eye algorithms, and to a lesser extent, predicable agent, algorithms could exist remains theoretically. Few scholars question the technical feasibility of algorithms. The discourse is rather in regards to whether such scenarios could arise in real market conditions.

2.3.1 Initial Simulations

In 1984, Axelrod organised a computer tournament.[70] Essentially, the tournament involved experts within game theory, each programming an algorithm that would play a game of iterated Prisoner's Dilemma game[71] against itself and all other summited algorithms. Participants could not communicate with each other before summiting their algorithms. In this game, 40 years ago, the winning algorithm developed a model that, within competition law, would be described as a tit-for-tat model[72].

Algorithms today have come a long way from the eighties and no longer require game-theory experts to learn – they can learn to play all on their own. Hingston and Kendall[73] in 2004 and Agrawal and Jaiswal in 2012 ran similar simulations with algorithms developed through machine learning, with their simulations also ending up in a tit-for-tat system.

2.3.2 Prevalence of Algorithms

Within the scope of competition law, it has been noticed that algorithms are highly prevalent in today's market. In respective studies, the European

[68] Cf. Ezrchi and Stucke (2016), pp. 76-77.
[69] See Ch. 2.1.1-2.
[70] Axelrod, R., The Evolution of Cooperation (Rev. ed., Basic Books, 2006).
[71] See Ch. 2.1.4.
[72] That is, cooperation initially, thereafter only if reciprocal cooperation.
[73] Hingston, P., and G. Kendall, 'Learning Versus Evolution in Iterated Prisoner's Dilemma' in Proceedings of the Congress on Evolutionary Computation (CEC'04) (2004), available at http://www.cs.nott.ac.uk/~pszgxk/papers/cec2004ph.pdf. [Accessed 1st January 2024]

Commission (EC) (2017) has found that 32.6%,[74] and the Norwegian Competition Authority (2021) 55%,[75] of surveyed firms used algorithms to track competitor's prices. However, pricing algorithms are not as a frequently occurrence, only appearing in 11% (EC, 2017)[76], 20% (Norway, 2021)[77], 17% (Denmark, 2021)[78] and 16% (Netherlands, 2019)[79], of surveyed companies.

In regard to algorithmic collusion, it has been observed that the deployment of pricing algorithms results in price increases. Most prominently, this has been discussed in relation to the German gasoline market.[80] Besides this, there have been few observed cases of algorithmic collusion in the style of a Digital eye scenario.

2.3.3 Discourse on Required Market Conditions

The former European Commissioner for Competition, Margrethe Vestager, described this scenario as "science fiction".[81] Research into the feasibility of autonomous algorithmic collusion has largely relied on a method called *Q-learning.*[82] Initially, studies did find the potential for algorithms to collude but were generally met with criticism that this was only possible in controlled settings.[83] The early research that has been made into this field can, in summary, be said to be inconclusive. Additionally, the testing that has taken place has almost exclusively been in duopolistic or oligopolistic markets.[84] Sceptics generally point to one out of two technical barriers algorithms will have to overcome. First, it is not entirely certain that algorithms can communicate with each other in the manner needed to form collusive agreements. Whilst algorithms certainly can communicate,[85] it remains uncertain whether this can

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[74] European Commission, *Final Report on the E-commerce Sector Inquiry* - Commission Staff Working Document accompanying the document (2017), available at https://eur-lex.europa.eu/resource.html?uri=cellar:9d1137d3-3570-11e7-a08e-01aa75ed71a1.0001.02/DOC_1&format=PDF. [Accessed 1st January 2024]

[75] Norwegian Competition Authority (2021).

[76] European Commission (2017), Final report on the E-commerce Sector Inquiry - Commission staff working document accompanying the document, https://eur-lex.europa.eu/resource.html?uri=cellar:9d1137d3-3570-11e7-a08e-01aa75ed71a1.0001.02/DOC_1&format=PDF. [Accessed 1st 2024]

[77] Norwegian Competition Authority (2021).

[78] Danish Competition and Consumer Authority (2021).

[79] Authority for Consumers and Markets (2019).

[80] Assad, S., Clark, R., Ershov, D., & Xu, L. (2020). Algorithmic pricing and competition: Empirical evidence from the German retail gasoline market

[81] Margrethe Vestager (2017), European Commissioner for Competition. (Speech at Bundeskartellamt 18th Conference on Competition, Berlin, 16 March 2017) (https://ec.europa.eu/newsroom/comp/items/55994/en

[82] The functioning of which are beyond the scope of this thesis, essentially the more advances models use a type of deep reinforcement learning.

[83] See e.g. Klein, T (2021); Calvano (2020).

[84] See e.g. Hettich (2021).

[85] See e.g. Cao, K., Lazaridou, A., Lanctot, M., Leibo, J. Z., Tuyls, K., & Clark, S., 'Emergent Communication through Negotiation' (2018), ArXiv, https://arxiv.org/abs/1804.03980 [Accessed 2nd of January 2024]; Crandall, J. W., Oudah, M., Abdallah, S., Bonnefon, J.,

reach the sophistication needed to form anti-competitive agreements.[86] Second, it has been questioned whether it is possible to achieve "algorithmic homogeneity". The argument goes that without the same training data and conditions for each algorithm and undertaking, different algorithms' goals will never completely align. Subsequently, a collusive agreement can never be maintained.[87] In summary, it can be said that most legal scholars and Competition watchdogs remain carefully sceptical.

2.3.4 Conclusion

It remains uncertain whether the digital eye scenario is entirely theoretical or a potential harm in the near future. Even then, there is a large spectrum ranging between minor relevance for competition law and the fundamental paradigm swift that some authors have suggested. Simulations do suggest the possibility, and some empirical evidence does suggest usages of algorithms lead to high prices. Both of these facts can nevertheless be argued to have arisen in market conditions well-suited for collusion. In a messier real-world market, scholars have argued that it is far more difficult for algorithms to reach such collusive outcomes.

Briefly commenting upon this, it should be noted that while it is true that messier real life market conditions do make algorithmic collusion more difficult. Deployment in real markets simultaneously allows algorithms to gather data of higher relevance since it is able to observe how markets react to its own conduct (self-learning) and a greater quantity of data. Additionally, the development of both algorithms and computing power has increased exponentially and is expected to continue to do so. Lack of sufficient data and lack of computing power are the main limiting factors for algorithmic development; hence, assuming that a digital eye scenario is theoretically possible, it may be upon us sooner than expected.

Cebrian, M., Shariff, A., Goodrich, M. A., & Rahwan, I., 'Cooperating with Machines' (2018) Nature Communications 9(1), 1-12.

[86] See e.g. Normann, H-T., and Sternberg, M., 'Do Machines Collude Better than Humans?' (2021) Journal of European Competition Law & Practice 12(10), 765–771, p. 770.

[87] See Petit, N, 'Antitrust and Artificial Intelligence: A Research Agenda' (2017) Journal of European Competition Law & Practice 8(6), 361–362; Dolmans, M., 'Artificial Intelligence and the Future of Competition Law - Further Thoughts (Reaction to Prof. Ariel Ezrachi)' (GCLC Lunch Talk: "Algorithms and Markets: Virtual or Virtuous Competition?, 2017").

3 Current Legal Framework

3.1 Introduction to art. 101 TFEU

One of the main pillars of EU competition law is art. 101 TFEU prohibits collusive agreements regardless of form. The text in art. 101 (1) TFEU reads as follows:

> The following shall be prohibited as incompatible with the internal market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market [Emphasis Added]

The application of art. 101 (1) TFEU require four cumulative criteria, namely:

(1) the practice needs to involve two or more undertakings (the sole action of a single undertaking is rather a question under art. 102),
(2) the effects of the practice should affect, or at least potentially affect,[88] the internal market,
(3) a requirement of substance; the practice should by object or effect limit (prevention, restriction, or distortion) competition, and,
(4) the practice should take the form of an agreement, decision by association, or concerted practice.

Additionally, art. 101 (1) lists practices of a particular risk of falling under the article. Agreements and decisions falling under art. 101 (1) can never be enforced, but are automatically void, that follows from art. 101 (2). Lastly, art. 101 (3) provides an opportunity for behaviours to be excepted from art. 101 (1) if it fulfils certain criteria. Contrary to prior regulations, the current regulation under art. 101 (3) does not provide for any official *ex ante* decision if the criteria are fulfilled. In contrast, each undertaking has to make its own assessment. The Commission may, regardless of the assessment, decide an infringement *ex post*.

Fundamentally, we're interested in figuring out whether collusive behaviours committed by algorithms fall within this paragraph of the article. This mainly entails looking at the fourth criterion. In this chapter, we initially take a broader scope of the established understanding of these terms. The three alternative requirements of a "meeting of the

[88] Established in caselaw, see e.g. C-319/82, *Kerpen & Kerpen*; C-240/82 and others, *Stichting Sigarettenindustrie*, para. 48.

minds" (4th criteria), "agreement, decision of association, or concerted practice", are the focus of the remainder of this chapter (hereinafter *criteria of coordination*).

Do note that the term "undertaking" is, to an extent, indispensably linked and has a crucial importance also for these alternatives. However, the Court of Justice has adopted a broad definition.[89] In *Höfner and Elser v Macrotron GmbH*, the Court of Justice said, "any entity engaged in an economic activity…".[90] For the purposes of this thesis, any further discussion on the definition is outside the scope of this thesis.

3.2 Agreements

The precise form or structure of an agreement is unimportant, rather the definition of agreement centres around a "concurrence of wills". An action may *prima facie* be a unilateral measure, however, as long as there exists a common intention for the market behaviour, that behaviour constitutes an agreement under art. 101 TFEU.[91]

Naturally, any legally binding agreement falls under this term,[92] with no consideration to the type of agreement.[93] Even non-binding agreements such as a protocol[94], a "gentlemen's agreement",[95] or even an "understanding"[96] fall within the scope of the definition.[97] Similarly, so do agreements which was entered into by an individual who lacks the authority to do so.[98] Further can also the issuing of guidelines and other forms of correspondence qualify as an agreement.[99] Whether an agreement is oral or written, holds no

[89] See e.g. C-180/99 etc, *Parlov*; C-475/99 *Ambulanz Glöckner v. Landkreis Südwestpfalz*.

[90] See C-41/90, *Höfner and Elser v Macrotron*

[91] See T-41/96, *Bayer v. Commission*, para. 69; C-2/01 P etc, *Bundesverband der arzneimittel Importeure eV v Ba7er* AG, para. 96-98.

[92] Some exceptions do exist; however, these exceptions are more closely connected to the term "undertaking" than "agreement", e.g. *Albany (labour) Exception* & *Single Entity Doctrine.* See above and Whish & Bailey, pp. 92-93 & 95-101.

[93] See e.g. C-258/79 *Nungesser*, para 82-89 (Court settlement); C-35/83 *Bat v Commission* (Trademark delimitation agreements); C-277/87 *Sandoz Prodotti Farmaceutoco SpA v Commission* (Standard terms).

[94] 94/210/EC: Commission Decision of 29 March 1994 relating to a proceeding pursuant to Articles 85 and 86 of the EC Treaty (IV/33.941 - HOV SVZ/MCN).

[95] See e.g. C-41/69, *Quinine Cartel* EU:C:1970:71, para. 110-114; C-45/69, *Boehringer,* , para. 27-29; T-54/03, *Lafange,* para 219.

[96] See e.g. C-240/82 etc., *Sigarettenindustrie*.

[97] On the distinction with concerted practices, see below.

[98] See C-100 to 103/80 *Musique Diffusion française and Others v Commission*, para. 97; C-68/12, *Protimonopolný úrad Slovenskej republiky v Slovenská sporiteľňa a.s.*, paras 24-25; T-53/03 *BPB plc v Commission*, para 360.

[99] 2000/146/EC: Commission Decision of 14 December 1999 relating to a proceeding pursuant to Article 15(1)(b) of Council Regulation No 17 (Case No IV/34.237/F3 - Anheuser-Busch Incorporated - Scottish & Newcastle), para. 26.

relevance.[100] Continuous contact is not required; even a single meeting has been deemed sufficient.[101]

In addition, an agreement must not even have been reached in full if there is a consensus on competition-restricting measures.[102] An agreement must not have been implemented to fall under art. 101 TFEU.[103] Further, an agreement does exist even if entered under coercion.[104] However, mandatory rules from public authorities have been accepted as a valid defence.[105] Non-mandatory rules, even from public authorities, are not sufficient for this defence.[106]

Continuing, having taken regard to the specific instances that in caselaw, a brief, more conceptual view of an agreement will be examined. As should be obvious from the earlier mentioned caselaw, the scope of an agreement under art. 101 TFEU is broader than under general contract law, which, generally throughout the Union, rests on the offer-acceptance model.[107] Theoretical models proposed for an agreement under art. 101 TFEU, in doctrine, are numerous. Black proposes two similar models initially:

> X and Y agree that X will do Ax and Y will do Ay where:
> (a) X undertakes to Y that, if Y will undertake to X that Y will do Ay, X will do Ax;
> (b) Y undertakes to X that Y will do Ay;
> (c) Y's reason for giving the undertaking in (b) is that X gives the undertaking in (a); and
> (d) X has the justified belief that (b).[108][109]

Black modifies this slightly for his second proposed model, simplifying (a) to: "X undertakes to Y that, if Y will do Ay, X will do Ax". The reason for the change is to fit a slightly different line of caselaw better.[110]

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[100] See e.g. C-28/77 *Tepea v Commission*.

[101] See C-8/08 *T-Mobile,* EU:C:2009:343, para 60.

[102] See T-9/99 *HFB and Others v Commission*, para. 206.

[103] Commission decision of 29 September 2004 *French Beer,* para 64.

[104] See T-83/08 *Denki Kagaku Kogyo Kabushiki Kaisha v Commission*, paras 61-62; T-21/05 *Chalkor AE Epexergasias Metallon v European Commission,* para.72.

[105] See C-359/95, and C-379/95 P *Commission of European Communities and French Republic v Ladbroke Racing Ltd.*

[106] C-280/08 P, *Deutsche Telekom AG v European Commission,* paras. 80-82. For more on the distinction, see Van Bael & Bells, *Competition Law of the European Union* (6th ed. 2021), Wolters Kluwer.

[107] Cf. § 145 Bürgerliches Gesetzbuch (Germany); art. 1101 & 1113-1114 Code Civil (France); 1 § Aftalelov (Denmark); art. 6:217 & 3:37 Burgerlijk Wetboek (The Netherlands); 1 § Avtalslagen (Sweden)

[108] Whereas X & Y are undertakings and Ax & Ay are actions taken by X & Y respectively.

[109] Black, O., *Conceptual Foundations of Antitrust* (Cambridge University Press, 2005).

[110] Ibid, p. 110.

3.3 Decisions by Associations

3.3.1 Traditional Understanding

To achieve collusion, undertakings sometimes utilize common associations. In particular, this phenomenon is most present in markets with a large number of market players.

The criterion can be subdivided into two separate criteria: "decision" and "association of undertakings". However, this separation is not always used in practice and is rarely explicitly made by the Court of Justice.

Examples of behaviour that, in caselaw, have fallen within the meaning of the term "decision", include decisions on the operation of the association,[111] agreements entered into by the association,[112] as well as recommendations, guidelines and more issued by the association.[113] Similarly to agreements, the binding force of a decision is not necessary.[114]

On the criteria of "association of undertakings", Advocate General Léger summarised the Court of Justice's caselaw as centred around the two criteria "composition and the legal framework".[115] This can be seen as the traditional approach of investigating if an organisation qualifies as association of undertaking. However, with the development in more recent caselaw, it could be argued that this approach is too narrow.[116]

Concretely, all entities that represent undertaking can, in theory, be associations of undertaking; two examples of what have fallen within reach of the criteria are two groups for traders and non-profit organisations[117].

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[111] See 89/44/EEC; partly annulled by Court of Justice but not in relevant part, C-360/92 P Publishers Association v Commission [1995] ECR I-23, EU:C:1995:6. The General Court upheld the decision, T-66/89, Publishers Association v Commission (No 2) [1992] ECR II-1217, EU:T:1992:84. Commission's decisions since have upheld the established practice, see: Coapi [1995] OJ L 122/37, para 34; Nederlandse federatieve Vereniging voor de Groothandel op Elektrotechnisch Gebied and Technische Unie (FEG and TU) [2000] OJ L 39/1, para 95; Visa International [2001] OJ L 293/24, para 53; Visa International – Multilateral Interchange Fee [2002] OJ L 318/17, para 55; International Skating Union's Eligibility Rules, Commission Decision of 8 December 2017, para 152.

[112] See e.g. C-71/74 *Fruit- en Groentenimporthandel and Frubo v Commission*, paras 28-32 (Frubo); C-123/83 *BNIC v Clair*, para 20; C-136/86 *BNIC/Aubert,* para 13.

[113] See e.g. C-96-102, 104-105, 108 & 110/82, *IAZ International Belgium NV v Commission*; C-136/12, *Consiglio nazionale dei geologi*, paras. 46-52.

[114] See e.g. C-8/72 *Vereeniging van Cementhandelaren v Commission*; C-71/74 *Frubo*; Joined cases C-209-215 & 218/78, *Van Landewyck v Commission* (Landewyck); C-45/85 *VDS v Commission,* EU:C:1987:34, para. 32.

[115] C-309/99, *J. C. J. Wouters, J. W. Savelbergh and Price Waterhouse Belastingadviseurs BV v Algemene Raad van de Nederlandse Orde van Advocaten*, EU:C:2001:390, Opinion of AG Léger, para 66.

[116] See next Ch.

[117] See C-209 to 215 & 218/78 *Landewyck*, paras 87-88.

Recognition of the association as a legal entity within national law is not a requirement for falling under the criteria.[118]

One notable exception to the generally broad scope of the term is trade associations established by public authorities, such as professional bodies. Such associations fall outside the scope of art. 101 TFEU, due to its public law nature.[119] The Court of Justice has, however, rejected this defence in situations where the public law nature only occurred after the decision in question.[120]

A note on the distinction between agreements and decisions is that a decision to create an association sometimes falls under the term "agreement".[121] Similarly so, if decisions by associations, in actuality, are constructed as an agreement among its members, this too falls under agreement rather than a decision by association.[122]

3.3.2 A New Approach? The *Mastercard* Case

In the case *Mastercard*[123]*,* the Commission, and later the Courts, appear to have widened the scope of the term "association of undertakings". Mastercard had started as a cooperation between financial institutions, as a payment solution. Initially, the organisation was entirely owned and controlled by the participating financial institutions. However, in 2006, Mastercard was listed on the New York stock exchange, and subsequently ownership and control were to an extent dispersed. The question before the Court (relevant to this thesis) was whether Mastercard could be considered an association of undertaking, even after the public listing.

Initially, it is worth noting that the commission stated that there is no requirement for consensus among the members of the association. Even if one or more members refuse to accept the decision, it can still qualify as a decision of an association if it is taken by the competent authority.[124] The point of view was not directly challenged by the applicants, although it could be argued that they indirectly challenged it.

Instead, the applicant argued that although Mastercard initially was an association of undertakings, public listing of the association made it a separate

[118] C-123/83, *BNIC v. Clair*, EU:C:1985:33, para. 17.

[119] See C-35/96 *Commission v Italy*, para 40; C-180 to 184/98, *Pavlov*, para 85.

[120] See e.g. C-180/98 to C-184/98 *Pavlov,* paras 67-68.

[121] Cf. 84/191/EEC: Commission Decision of 30 March 1984 relating to a proceeding under Article 85 of the EEC Treaty (IV/30.804 - Nuovo CEGAM); 80/917/EEC: Commission Decision of 9 July 1980 relating to a proceeding under Article 85 of the EEC Treaty (IV/27.958 National Sulphuric Acid Association)

[122] See C-209 to 215 & 218/78 *Landewyck*.

[123] COMP/34.579; T-111/08 Mastercard Inc v Commission EU:T:2012:260; C-382/12 Mastercard Inc v Commission, EU:C:2014:2201.

[124] *Mastercard,* COMP/34.579, para. 384.

entity falling outside the scope of the term "association of undertaking". A change of control had occurred since, after the listing, a majority of board members had no affiliation with the financial institutions. Additionally, the decision power the financial institutions retained was irrelevant to the alleged infringement at hand.[125]

Both Courts rejected this argument and upheld the Commission's decision. In doing so, they relied on a concept of "commonality of interests", which, at least combined with the retained *de facto* decision-making power, was sufficient to qualify Mastercard as an association of undertakings.[126]

As pointed out in the judgments, this was not completely the first time the Courts have relied on such a concept.[127] However, some legal scholars have interpreted the judgement as a confirmation of the commonality of interests criterion as sufficient to qualify an entity as an association of undertakings.[128]

3.4 Single and Continuous Infringement

A question that regularly arises in caselaw and has grown to be rather important is that of whether an offence is one continuous infringement or if it is multiple separate infringements.[129] Mainly, the concept is relevant when it cannot be proven that one or multiple undertakings participated in every part of the alleged infringement. If the Court finds a single and continuous infringement, all undertakings involved are responsible for the entire duration of the infringement.[130]

The General Court summarised the caselaw regarding single and continuous infringement in *Team Relo v Commission*.[131] The Court found certain cumulative criteria for the scope of the term.

First, there must be "an overall plan" regarding the shared objective. In a different case, the General Court described it as the necessity for actions within the cartel to be complementary. However, this requirement has been overruled by the Court of Justice.[132] *Whish & Bailey* point to a new line of reasoning in the General Court's caselaw, where an overall plan exists if the

[125] See C-382/12, paras. 49-53.

[126] See T-111/08 *Mastercard Inc v Commission*, paras 244-259; C-382/12 *Mastercard Inc v Commission*, paras 62-77.

[127] Cf. C-45/85, para.29. Cited in C-382/12, para 73; T-111/08, para. 251.

[128] See below, discussion on Van Cleynenbreugel (2020).

[129] Concept first developed in *Polypropylence* OJ [1986], upheld in T-1/89 *Rhône-Poulenc v Commission*, EU:T:1991:56, para 126, and in C-49/92 P *Commission v Anic*, paras. 82-83.

[130] See e.g. T-186/06 *Solvay SA v Commission*, paras 91-92; T-235/07 *Bavaria v Commission*, para 183.

[131] T-204/08 *Team Relocations and Others v Commission*.

[132] Cf. T-101/05 etc *BASF v Commission*, paras 179 & 181; C-239/11 P *Simemans v Commission*, para. 248; C-239/13 P *Villeroy & Boch v Commission*, para 69.

different actions are identical by either effect or object.[133] Since then, the Court of Justice has ruled on the appeal, upholding the General Court's judgement in the relevant part, however, without any mention or reference to this line of reasoning.[134] What constitutes an overall plan remains, to the extent of my understanding, partly undefined.

Second, there must be an "intentional contribution" of the undertaking to the overall plan. This criterion has nevertheless been interpreted rather broadly. For example, in the previously mentioned Team Relo v Commission, the Court of Justice stated that contribution must not have been made at the same time or in pursuance of the same goal.[135] Furthermore, the fact that an undertaking had reservations or intended to cheat the agreement is not a valid defence.[136] However, intentional contribution must be proven by the Commission and cannot be presumed.[137]

Third, the General Court has repeatedly held that the undertaking in question must be aware of the conduct of his fellow cartelist.[138] This is in regard to the scope and certain "essential characteristics of the cartel as a whole".[139] Contrary to the second creation, awareness can be presumed when the undertaking "could reasonably have foreseen it and that it was prepared to take the risk."[140]

Partial liability for less than the full duration of the cartel, that is, to the extent the undertaking was aware of the conduct, has been accepted in caselaw.[141] Additionally, in *Trelleborg Industrie v Commission,* the General Court introduced a new concept of "single and repeated infringement". This is relevant for cases where participation for the entirety of the duration cannot be proven, e.g. if an undertaking leaves and rejoins the cartel. In such cases, the undertakings can be held liable with the exception of periods of interruption.[142]

In spite of that, partial liability for only holding a "subsidiary, accessory or passive" role is not recognised in EU competition law. Such liability was discussed by AG Wahl, making an analogy from the criminal law concept of

[133] See Whish & Bailey (2021) p. 108, with reference to T-105/17 *HSBC Holdings plc v Commission*, para. 201.

[134] See C-883/19 P *HSBC Holdings and Others v Commission*, para 210.

[135] See C-444/11 P *Team Relocations and Others v Commission*, para 56.

[136] See C-291/98 P *Sarrió v Commission*, para. 50; C-204/00 P etc *Aalborg Portland A/S v Commission*, para 85.

[137] See T-25/95 etc *Cement*, paras 4027, 4060 4109 & 4112.

[138] Cf T-68/09 *Soliver v Commission*, EU:T:2014:867, paras. 63-64; T-758/14 *Infineon Technologies AG v Commission,* EU:T:2016:737, para. 222. Partly annulled in C-99/17 P, EU:2018:773, stated again in the renvoie decision, T-754/14 REEV, EU:T:2020:307.

[139] See T-68/09, EU:T:2014:867, para. 63; T-259/02 to T-264/02 & T-271/02 *Raiffeisen Zentralbank Österreich and Others v Commission*, paras. 191 & 193; T-385/06 *Aalberts Industries and Others v Commission*, paras. 111-119.

[140] C-49/92 P *Anic*, para. 87.

[141] See C-293/13 P etc *Fresh Del Monte*, paras. 156-160.

[142] See T-147/09, EU:T:2013:259, esp. para. 88; T-655/11 , EU:T:2015:383, paras 491-498; T-240/17 *Campine NV v Commission*, EU:T:778 paras 267-284.

"accomplice".[143] However, although they reached opposite conclusions for the matter at hand, both AG Wahl and the Court rejected the idea.[144]

The concept of *single and continuous(repeated) infringement* has a more complex but perhaps also broader meaning within the term of concerted practices. As discussed, within the term agreement, the concept is generally used to determine the scope of the cartel, which undertaking participated, and for how long. However, it could be argued that it has a paramount role in the very existence of a cartel. In that direction, in *Almanet v Commission*, the General Court stated that a cartel must not relate to one kind of product, provided there exists a common economic aim.[145]

3.5 Concerted Practices

3.5.1 Grey area between Concerted Practices and Agreement/decision of association

Considering the broad definition adopted in caselaw for agreement, the distinction *vis a vis* concerted practices have become a grey area, if there even is such a thing. In some cases, the Commission has held the view that the terms are conceptually different.[146] At the same time, the Commission has commonly simply used "and/or" between the terms.[147]

The use of the "and/or" terminology was challenged before the Court of Justice.[148] The Court upheld that the terms consisted of different elements, they are not mutually incompatible, and the Commission is under no obligation to distinguish between the terms.[149] The terms serve as a way for undertakings to increase the predictability of the other's conduct, differing solely in "their intensity and the forms in which they manifest themselves"[150], hence the important distinction is between collusive and non-collusive behaviour.[151] This position of the Court has been upheld in subsequent case law.[152]

Whereas comments on the relationship between the terms, concerted practices have been seen as a lesser form of an agreement, cooperation that has not

[143] See C-194/14 P *AC-Treuhand v Commission*, Opinion of AG Wahl, para. 82.
[144] Ibid, para. 83; C-194/14 P *AC-Treuhand,* paras. 38-43.
[145] T-410/09 *Almamet v Commission*, paras 158 & 172-173.
[146] *Polypropylene,* OJ [1986] L 230/1, para. 86
[147] See *Cartonboard,* OJ [1994] L 243/1, para 128; *Pre-Insulated Pipe Cartel,* OJ [1999] L 24/1, paras 131-132; *Canned Vegetables*, Commissions decision of 27 September 2019, paras 47-49; *Marine Car Carriers*, Commission decision of 21 February 2018, paras 49-53.
[148] C-49/92 P *Anic*.
[149] Ibid, para. 132.
[150] Ibid, para 131.
[151] Ibid, paras. 112 & 131. See also C-48/69 *Imperial Chemical Industries Ltd. v Commission of the European Communities*, para 64. (Dyestuff)
[152] C-238/05 *ASNEF-EQUIFAX*, para 32.

resulted in an agreement.[153] Based on this understanding of the relationship, a theoretical question is if a single conduct can be both an agreement and a concerted practice. The Commission circumvented this question:

> […] as an infringement may present simultaneously the characteristics of each form of prohibited conduct, while considered in isolation some of its manifestations could more accurately be described as one rather than the other A cartel may therefore be an agreement and a concerted practice at the same time.[154]

Lastly, it should be considered whether the distinction between the terms, matters. Advocate General Reischl has deemed the classification "unimportant".[155] However, in *Solway SA*, the Court of Justice went to the effort of pointing out that the General Court erred in its legal reasoning when classifying a concerted practice as an agreement.[156] From the previously mentioned cases and commission decisions, does nonetheless Reischl's conclusion, broadly, appear well-founded. For the purposes of this thesis, however, the distinction is of crucial rule *noscitur a sociis.*

3.5.2 Parallel Behaviour

In our markets today prices often appear to be risen and lowered in parallel, especially in oligopolistic markets. Based on this, one might assume that a price cartel has been created and is artificially controlling the prices. However, this is far from always the case. Often, competitors appreciate markets in a similar manner and hence come to the same conclusion to raise or lower prices. Increasing costs for material, labour or shipping, entry of a new market player, political decisions, etc., often affect all competitors to a comparable extent. Therefore, a similar market reaction is to be expected.

Legally, parallel behaviour without any coordination is and should be legal. For this, the case *Suiker Unie* is commonly cited, whereas the Court stated that "each economic operator must determine independently the policy which he intends to adopt on the market".[157] Distinguishing between parallel behaviour and a concerted practice is, in actuality, a difficult task. Especially considering that companies go to great lengths to avoid any proof of coordination ending up in the hands of competition watchdogs.

3.5.3 Concerted Practices in Caselaw

Not originally part of the Rome Treaty, the term "concerted practices" has later been added to broaden the scope of art. 101 TFEU to also include other behaviours that distort fair competition. Acting as the foundation for the Court

[153] Cf C-48/69 *Dyestuff*, paras. 64-65; *Polypropylene,* OJ [1986] L 230/1, paras. 86-88;
[154] Pre-Insulated Pipe Cartel, OJ [1999] L 24/1, para. 132.
[155] See C-209/78 etc *Landewyck*, Ch. b1.
[156] C-455/11 P *Solvay*, para. 54.
[157] C-40 to 48, 50, 54 to 56, 111, 113, & 114/73, para. 173.

of Justice's caselaw on concerted practices, the *Dyestuff*[158] case provides an initial understanding of the term.

In *Dyestuff,* the Commission had observed and subsequently fined several undertakings after prices had been raised at suspicious points in time. No hard evidence had been presented by the Commission; instead, it relied on the time and amount of the price increases as well as documents of instructions between mother-and-daughter companies and evidence of informal contact between the accused undertakings. This proved to be sufficient. On the objective of Concerted Practices, the Court stated that the term extends the scope of the article to include cooperation where firms "…knowingly, substitutes practical cooperation between them for the risks of competition."[159] This formulation was repeated in the related cases that year.[160]

The next major case after *Dyestuff* was the *Suiker Unie* case.[161] Initially, the same formulation from *Dyestuff* is repeated.[162] The Court then connected concerted practices with the freedom of movement of products, stating a practice to the detriment of the freedom is particularly concerning.[163] Additionally, the Court opens the door for a more functional approach, stating that "the facts […] are considered not separate but as a whole".[164] Most significantly does *Suiker Unie* clarify that "the criteria of coordination and cooperation […] in no way require the working out of an actual plan…". As previously mentioned, there is a notable assertion on the distinction between legal parallel behaviour and illegal coordination. In firm language the Court outlaws any contact that tries to influence a competitor's market conduct and any discloser of their own contemplated market conduct, nevertheless fundamentally economic operators must be able to intelligently react to the market.[165]

In the preliminary ruling, Zuechner v Bayerische Vereinsbank relied upon the *Suiker unie* case. On the question of whether bank transaction fees constituted concerted practices, the Court stated that concerted practices required "…contacts or, at least, exchanges of information…" regarding the future rate of the fees.[166] Similarly, the joined cases, known collectively as Woodpulp, rely on the Suiker Unie case when deciding whether quarterly price announcements themselves could be considered a concerted practice. The quarterly announcements effectively served as a maximum price for orders of pulp for the upcoming quarter. Contrary to the *Zuechner* case, there was clear contact.

[158] See C-48/69.

[159] Ibid, para 64.

[160] C-51/69 *Bayer*, para. 25; C-52/69 *Ciba-Geigy*, para 26; C-53/69 *Sandoz*, para 26; C-54/69 *Francolor*, para 51; C-55/69 *Cassella*, para 30; C-56/69 *Hoechst,* para 30; C-57/69 *ACNA*, para. 49.

[161] Joined Cases C-40 to 48, 50, 54 to 56, 111, 113, & 114/73.

[162] Ibid, para. 26.

[163] Ibid, para 27.

[164] Ibid, para 28. See also C-697/19 P *Sony Corporation and Sony Electronics v Commission*, paras 62-63; C-698/19 P *Sony Optiarc and Sony Optiarc America v Commission*, paras 59-60.

[165] Ibid, paras. 173-174.

[166] C-172/80, paras 21-22.

However, the Court stated that "the price announcements… does not lessen each undertaking's uncertainty as to the future attitude of its competitors".[167] The Court of Justice takes a similar approach to the reduction of uncertainty in the case of *John Deere*. There, the Court reached the opposite conclusion, based on factual differences.[168] For further discussion on the use of the term "uncertainty", see references to *Odudu* in the next chapter.

The case *Zinc Producers* presents a rebuttable presumption that goes something like, if the only reasonable explanation for a conduct is coordination between competitors, it is presumed to be a concerted practice. To rebut this presumption, it is sufficient to present an alternative reasonable explanation for the conduct. *In casu* the applicant explained the conduct by a failure of payment.[169]

Another presumption for concerted practice is that if an undertaking remains active on the relevant market and has taken part in a concerted action, it utilises the information gathered from competitors for deciding their own market conduct.[170] In *T-Mobile,* this presumption was titled under the term "causal connection", and as mentioned above, participation in a single meeting is sufficient to trigger the presumption. Notably, the Court made this out to be the upper limit to how strict NCAs' requirements of evidence could be,[171] effectively setting this presumption to the furthest extent of the term concerted practices.

We are reminded of the doctrine of *single and continuous infringement* in *Aalborg Portland A/S & others v Commission.* For participation in a concerted practice, an undertaking must have "intended to contribute by its own conduct".[172] Earlier mentioned as "awareness" under the third requirement for the doctrine. As stated, this can be presumed if the undertaking could foresee it and be presumed to be willing to accept the risk.[173] However, it is sufficient that one party reveals their intentions for it to be a converted practice.[174] Arguably, neither party needs to reveal their intentions.

In a cross-appeal to the Court of Justice, the question of the necessity of actual market conduct was dealt with. Considering concerted practices, by their nature, only become apparent by market conduct, it was reasonable to question whether concerted practices, only by object, were an existing concept. Nevertheless, the Court answered in the affirmative. Acknowledging the necessity of some conduct, the Court went on to state that the conduct in question did not have to produce any distorting effect, provided it had an anti-competitive

[167] C- 89/85, paras 59–65. See also C-8/08 *T-Mobile*, paras. 32-35; C-449/11 P *Solway Solexis*, para 36 [Only available in French & Italian]; C-286/13 P, *Dole Food Company,* paras. 120-122.

[168] C-7/95 P *Deere v Commission.*

[169] C-29/83 *CRAM v Commission*, paras. 12–21.

[170] See e.g., C-199/92 *Hüls*, para. 162; C-8/08 *T-Mobile*, paras. 51-52.

[171] See C-8/08 *T-Mobile*, paras 44-62.

[172] C-204/00 P etc, *Cement*, para. 82

[173] See e.g. C-194/14 P *AC-Treuhand*

[174] T-202/98 *Tate & Lyle v Commission*, para 54.

object.[175] On the same issue, in *Hüls,* the Court of Justice referred to *Suiker Unie* and reliance on each undertaking's independence in making their market policy.[176] Presumably, this could function as the theoretical test of whether a conduct had an anti-competitive objective.

The applicants can naturally exonerate themselves by proving that practice had no such objective.[177] In practice, it has seemed as though it has only been possible by public distancing itself from the cartel.[178] Notably, such public distancing should be understood as such by the other cartelists.[179] The Court of Justice clarifies its case law on the matter in *Total*. Public distancing is required when an undertaking has participated in meetings of an anti-competitive nature for complete exoneration. However, it is not necessary to find that an undertaking has ceased to participate in a cartel; in such case, it can be shown by other means.[180] The caselaw was further clarified in the preliminary ruling *Eturas.* In which an online booking service for travel agencies implanted measures for capping the discount rate at 3%, a high discount although it possibly requires an additional procedure. The Court stated that the presumption can be reputed by publicly distancing or reporting to the administrative authorities, as consistent with earlier caselaw. Additionally, the Court wrote that since the undertakings could not know of all other addresses, the national court "may accept that a clear and express objection sent to the administrators of the E-TURAS system" is sufficient.[181]

In the case *Hüls,* although perhaps already evident from prior caselaw, the Court explicitly states that concerted practice implies *cause* between the communication of the undertakings and the market conduct.[182] As previously mentioned, such cause is nevertheless presumed.

It is well-established case law that there is a requirement for the undertakings to be on the same level of the supply chain, i.e. both vertical and horizontal cartels are caught by the concept of concerted practices. It is sufficient that one of the parties' conduct affects the relevant market.[183]

3.5.4 Theoretical Approach

As for the meaning of "agreement", numerous scholars have attempted to define the meaning of concerted practices as understood within the scope of art.

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[175] C-49/92P *Anic*, paras. 122-124. Repeated in C-199/92 *Hüls*, paras 163-165; C-105/04 *FEG*, para 139.

[176] C-199/92 *Hüls*, para 163.

[177] See T-25/95 *Cement*, para. 1865.

[178] C-204/00 P etc *Cement*, 84.

[179] C-290/11 P *Comap v Commission*, paras 74–76. See also Lianos et al (2019), p. 396.

[180] C-634/13 P *Total Marketing Services SA v Commission,* paras. 20-26. See further Opinion of AG Wahl, paras. 18-31.

[181] C-74/14 *Eturas UAB et al v Lietuvos Respublikos konkurencijos taryba.*

[182] C-199/92 *Hüls*, para 161.

[183] C-56/65 *LTM*, para. 358; C-56/64 & 58/64 *Consten and Grundig v Commission*, paras. 492 & 493; C-100/80 to 103/80 *Musique Diffusion française and Others v Commission*, paras 72-80; C-243/83 *Binon*, paras 39-47; C-306/96 *Javico*, paras 10-14; C-194/14 P *AC-Treuhand*, paras 34-35.

101 TFEU. This subsection will examine these practices rather closely due to their potential relevance for whether autonomous algorithmic collusion may fall within the scope.

Two different approaches to the meaning of concerted practices have been presented by Odudu: the common intention approach and the reduction of uncertainty approach.[184]

The common intention approach stems from US antitrust law and its concept of "conspiracy".[185] Odudu finds evidence of this approach in EU competition law in the AG opinions of Mayras[186], Darmon[187]. and Vesterdorf[188]. Darmon writes, "[art. 1 Sherman Act] prohibits any 'contract, coordination or conspiracy'… necessarily presuppose an 'agreement'…not necessarily the result of a legally binding contract." This reading of US law contains a problem *ejusdem generis*. If concerted practices presuppose an agreement, then the distinction of the terms is redundant. Many legal scholars hold an opposing view, to Darmon, of US law and caselaw.[189] A general consensus in legal doctrine has developed that concerted practice is a mutual intent not sufficient enough to ever be enforced in court.[190]

Questions in regard to evidence, *in casu*, of concerted practice and common intent, do fall outside the scope of this thesis. However, a brief look at what requirements are necessary to prove common intent provides some insights into the meaning of the term. According to *Antunes*, three factors are required to prove concerted practices. Initially, evidence of some kind of communication is required. Secondly, there must be some actions taken following the communication. Lastly, it must be possible to infer a consensus for the action

[184] See Odudu, O., *The Boundaries of EC Competition Law: The Scope of Article 81* (Oxford University Press, 2006), pp. 70-83.

[185] Section 1 of the Sherman Act, codified in 15 U.S.C. §§ 1 to 7, and caselaw thereof.

[186] C-48/69 *Dyestuff*, AG Opinion, p. 669

[187] C-89/85 etc. *Woodpulp*, AG Opinion, para. 166 footnote 71.

[188] T-1/*89 Rhône-Poulenc SA v Commission*, AG Opinion 927–929

[189] See e.g. Mann, F. A., 'The Dyestuffs Case in the Court of Justice of the European Communities' (1973) The International and Comparative Law Quarterly 22(1), 37, available at http://www.jstor.org/stable/758265; Korah, Valentine, 'Concerted Practices: The EEC Dyestuffs Case' (1973) 36 Modern Law Review 222.

[190] Odudu (2006), p. 75 with references, in particular: Waelbroeck, M, and A Frignani, *European Competition Law* (Ardsley, NY: Transnational Publishers, 1999), p. 131; Black, Oliver, 'Joint Action, Reliance and the Law' (2003) 14 King's College Law Journal 65–80, pp. 71-75; Furse, M, *Competition Law of the UK & EC* (Fourth Edition, London: Blackstone, 2004), pp. 146-152; Neven, Damien, 'Competition Policy Objectives' in European Competition Law Annual 1997: The Objectives of Competition Policy, edited by Claus Dieter Ehlermann and Laraine L Laudati (Oxford: Hart, 1998), 111–118, pp. 45-78.

taken.[191] Once again, a discussion centred on common intention as a necessary requirement for concerted practice is apparent.

Odudu is nevertheless critical of this approach.[192] The criticism is partly based on the case Suiker Unie, in which the Court states, "The criteria of coordination… in no way require the working out of an actual plan".[193] Legal doctrine has generally taken this to build on previous caselaw and further established that there is no certain method necessary for a common intention to express itself. Odudu goes beyond this and suggests that it could also be interpreted as there is no need for a common intention at all. [194] Expanding upon this, Odudu makes the further point that the common intention approach is too absolutist in its understanding of the existence of consensus; there is a spectrum between the maximalist point of consensus and that of non-consensus. Lastly, he argues that the US approach of "conspiracy", even within the broader understanding accepted in legal doctrine, is too narrow for EU competition law. As seen in Ch. 3.2, the scope of the term is broadly understood. Odudu argues that the US concept of conspiracy falls fully within the scope of the EU concept of agreement. Hence, once again, an issue of ejusdem generis and of concerted practices being redundant arises.[195]

As an alternative approach, Odudu suggests looking at the reduction of uncertainty for competitors' future behaviour. An agreement is, essentially, a way for competitors to reduce uncertainty by legal or moral means, relying on a common intention. Building upon this, concerted practices can be understood as any other behaviour that limits uncertainty.[196] As previously cited, the Court of Justice defined concerted practices as a behaviour "knowingly, substitutes practical cooperation between them for the risks of competition."[197] Odudu argues that "risk and uncertainty go together"; a decrease in uncertainty means an increase in risk for competition.[198] He finds some supporting evidence of this view in the *Tate and Lyle case* (British Sugar) as well as from the opinion of AG Vesterdorf.[199]

Black, contrary to Odudu, analyses the term concerted practices from more of a contract law perspective while also providing a deeper focus on linguistics.[200] Black also presents two theories along with the rationale for his own

[191] See Antunes, Luis Miguel Pais, 'Agreements and Concerted Practices under EEC Competition Law: Is the Distinction Relevant?' (1991) 11 Yearbook of European Law 57–77.

[192] Odudu (2006), pp. 80-91.

[193] C-40/73 etc. *Suiker Unie*, para 173.

[194] Odudu (2006), p. 80.

[195] Ibid, p. 81.

[196] Ibid, p. 81-82

[197] C-48/69, *Dyestuff*, para. 64.

[198] Odudu (2006), p. 82. See also therein cited caselaw.

[199] See T-202/98 etc. *Tate & Lyle*, para 46; T-1/89 *Rhône-Poulenc*, Opinion of AG Vesterdorf, para 942.

[200] Black (2005), pp. 141-183

interpretation. Initially, he makes an analogy from *Grice's analysis of speaker-meaning*[201], qualifying concerted practices if it reaches a certain complexity of interactions. In essence, a "hearer" should form a belief and recognise an intention from the other party, and the recognition should be at least part of his reasoning for forming the belief. Black slightly modifies this model and, by the end of it, argues that his altered version captures concerted practices both de lege lata and, to an extent, *de lege ferenda*.

The modified model, notably, relies on joint action instead of reliance. Black argues that joint action and concerted practices are synonymous. For the definition of the former, he uses the following model as a starting point for our understanding of a joint action model:[202]

(a) X, in doing Ax, relies on Y to do Ay;

(b) Y, in doing Ay, relies on X to do Ax;

(c) X, in relying on Y to do Ay, has the goal Gx;

(d) Y, in relying on X to do Ax, has Gy;

(e) Gx=Gy;

(f) X knows (a)–(e);

(g) Y knows (a)–(e);

(h) (f) is true partly because Y communicates (b) and (d) to X;

(i) (g) is true partly because X communicates (a) and (c) to Y. [203]

This model is not without flaws and does require a rather faithful interpretation. Regardless, if interpreted faithfully, it has some appealing features. Initially, the model distinguishes concerted practices from both agreements and individual conduct (cf. parallel behaviour). Continuing, it has the requirement of contact, as seen in, e.g., Zuechner v Bayerische Vereinsbank and *Woodpulp*[204].

Further, Black is of the opinion that the case law also shows a requirement of reciprocity and that cases of concerted practices often involve mutual deterrents.[205] For the former, Black cites the previously mentioned opinion of AG

[201] A model initially proposed in Grice, H. P.: 1957, 'Meaning', Philosophical Review 66, pp. 377-88, and later expanded on by Grice himself and other scholars. See e.g. Grice, H. P.: 1969, 'Utterer's Meaning and Intentions', Philosophic; Grice, H. P.: 1975, 'Logic and Conversation', in P. Cole and J. H. M. and Semantics: Speech Acts, Vol. 3 (Academic Press, New York); Armstrong, D. M.: 1971, 'Meaning and Communication', Philosophical Review 80(4); Bennett, Jonathan: 1976, Linguistic Behaviour (Cambridge University Press).

[202] See Black (2005), p. 155.

[203] Whereas: X & Y are undertakings; Ax & Ay are actions taken by X & Y respectively; Gx & Gy are goals for X & Y respectively.

[204] C-89/85 etc. *Woodpulp*.

[205] See Black (2005), p. 158.

Darmon.[206] While the latter, Black admits to lacking any direct authority, it is commonly mentioned in the case law.[207]

Black goes on to discuss various objections made against this model, all of which will not be summarised here. However, certain objections make for discussion particularly relevant to this thesis.

As discussed above, an undertaking can commit an infringement of art. 101 TFEU, even if it took part in the anti-competitive practice unwillingly. An objection to Black's model is that if an undertaking participates unwillingly, it does not share the same goal, hence (e) is inaccurate. Black offers multiple defences for his model, the most appealing being by disguising between the goal of an action and the goal of an undertaking. Even if an undertaking does not have a goal to distort competition, its action may. This would arguably require a modification to the model as follows:

(e) $G(Ax) = G(Ay)$

As discussed in the previous chapter, there is no requirement for conduct with an anti-competitive effect provided for an anti-competitive object. Does this mean that (a) & (b), and consequently (h) & (i), are superfluous? Black argues that the conduct relied upon in (a) & (b) is not necessarily conduct with an anti-competitive effect but a conduct taken with an anti-competitive objective. From *Anic*, it is acknowledged that some market conduct is required, this arguably in line with Black's argument. Black further argues that Competition authorities only pursue concerted practices with an anti-competitive, where an effect would eventually follow, the absence of even a potential future effect would render the anti-competitive objective irrelevant.[208]

A third, similar issue is with regards to (h) & (i) and that the communication must not be explicit. Like the last objection, Black responds to this by weakening his model so that communication can refer to any kind of transfer of information. Significantly, this is an issue with the model in regard to unilateral conduct, e.g. price announcements. Admitting that (h) & (i) are alternative requirements, this considerably weakens the model.

3.6 Unilateral Decisions

Unilateral Decisions as such, are decisions taken solely by one part, can never be caught within the scope of art. 101 TFEU, since it fails to fulfil the

[206] See paras. 170–1 of the Opinion by Darmon AG in Woodpulp: Cases 89/85 etc., *Cement*

[207] T-342/99, *Airtours plc v. Commission*, paras 61-62; T-102/96, *Gencor Ltd v. Commission*, para. 277

[208] See Black (2005), p. 160.

coordination criteria. However, the concept is narrowly defined, and invoking it as a defence has, for a large part, been a futile procedure. The argument made is that unilateral conduct forms part of a concerted practice if taken as a systematic step towards collusion within a contractual relationship.[209] In turn, the term contractual relationship has been broadly interpreted.[210] Certain limitations to the scope of finding a concerted practice within a prima facie unilateral decision, does however, exist. In *Bayer*, the Court of Justice held that it is not sufficient for a unilateral policy to achieve the same purpose as an agreed export ban for it to be considered a concerted practice.[211] Subsequent cases from the General Court and Court of Justice have, in sticking to previous caselaw, yielded varied outcomes, although a majority have found an agreement/concerted practice.[212]

There is obviously an apparent potential overlap with art. 102 TFEU. The above-mentioned line of caselaw is in relation to unilateral decisions in vertical arrangements, which warrant extra caution in relation to art. 102, this is due to the naturally apparent mutual dependence. When infringement of art. 101 TFEU is found it is often in some kind of hub-and-spoke model, see above.

Unilateral decisions in situation of horizontal cooperation are more rare and is often not referred to as such. An undertaking cannot directly influence a market conduct. Modifying the situation slightly, imagine an undertaking suggesting recommended prices to its competitor. This is, per se, a unilateral decision, but I would probably rather be referred to as an invitation to collude.

3.7 Concluding remarks

3.7.1 Tacit Collusion v. Concerted Practices

A commonly used term in discussions of algorithmic collusion and collusion in general is *tacit collusion*, meaning collusion without a formal agreement. A common saying is further that tacit collusion is not illegal as such.[213] Usually, combined with the exception, unless it is the only reasonable explanation, cf. *Zinc Producers*.[214] However, from the caselaw regarding concerted

[209] See C-107/82 *AEG v Commission*, para. 38; C-25 to 26/84 *Ford and Ford Europe v Commission*, para 21; T-43/92 *Dunlop Slazenger v Commission*, para 56.

[210] See C-277/87 *Sandoz*; T-19/91 *Vichy v Commission*.

[211] C-2/01 & C-3/01 *Bayer AG*, para 101.

[212] Cf. following case (list is not exhaustive):

Criteria of coordination fulfilled in: T-168/01 *GlaxoSmithKline Services v Commission*; T-13/03 *Nintendo v Commission*; T-18/03 *CD-Contract Data v Commission*, upheld in C-260/09 P *Activision v Blizzard Germany v Commission*; T-450/05 *Peugoet v Commission.*

Criteria of coordination not fulfilled in: T-67/01 *JCB Service v Commission;* C-74/04 P *Commission v Volkswagen.*

Partly not fulfilled in: T-368/00, *General Motors Nederland BV v Commission*.

[213] See e.g. Hawkes (2021), p. 3.

[214] C-29/83 *CRAM v Commission*.

practices, and to an extent also agreements, it is clear that proof of an explicit agreement is not necessary. Therefore, it is worthwhile to investigate the diffraction between these sometimes-confused terms.

Concerted practice is fundamentally a legal term, more specifically, a term with EU competition law. Its purpose and meaning do not exist outside of this specific field of law. Hence, the definition is entirely dictated by the developing caselaw. Further, although presented as a kind of conduct, this is, to a degree, misleading. Observed by its historical roots, concerted practices are a broadening of the scope of the agreement. To that extent, it is not wholly unreasonable to view concerted practices not as a conduct in itself but rather as a rule of alleviation of evidentiary burden for the term agreement. Regardless, it is clear that the term is inseparably entangled with agreements and EU competition law.

Tacit collusion, on the other hand, is indeed a conduct. In essence, is it a more negatively associated synonym for parallel behaviour. The term seemingly suggests an anti-competitive intent. However, this is not necessarily the case; tacit collusion can be entirely involuntary. For pedagogical purposes, this thesis has purposefully held the terms parallel behaviour and concerted practices apart so that no overlap is possible. Tacit collusion must, despite what was earlier stated, be understood as encompassing the scope of both terms. That is, all forms of non-explicit collusion, whether it is intended, legal, proven, or not.

3.7.2 Functional Approach

Competition law have over time become more complex. While a necessity to preserve a degree of legal formalism is required, not least due to the sensitivity border between parallel behaviour caused by market structures and anti-competitive behaviour, the Court of Justice has adopted a functional approach. Concepts such as the single and continuous and the emergence of new forms of cartels, e.g. hub-and-spokes cartels, have blurred the lines to formerly defined concepts. The functional approach is, arguably, by necessity.

The approach can be seen by the adoption of the earlier mentioned *single and continuous infringement* doctrine and further by the *single and repeated infringement* doctrine. Yet also by the presumptions seen in *Anic, Hüls, T-mobile*, *Zinc producers* and others. Arguably, the entire concept of concerted practice is a functional approach by the EU.

3.7.3 Key Takeaways

The *criteria of coordination* is better considered as a whole than as three alternative criteria (agreement, decision of association and concerted practice). While it is possible in the abstract to separate the terms, a distinction is neither necessary nor desirable. In that regard, it is even possible to argue that the

concept of concerted practice is not much more than a rule of evidence for proving an agreement (in a very wide interpretation of the word).

Regardless, if one agrees with such reasoning, the concept must be understood as having fundamental importance for competition law. In principle, various conducts fall outside the scope of art. 101 TFEU, e.g. tacit collusion, unilateral conduct, etc. However, presumptions have been constructed that make prima facie legal conduct fall inside the scope. As an example, does unilateral conduct appear to be able to fall within the scope if another undertaking remains active on the market, since knowledge shared by the unilateral conduct can be presumed or if it has an anti-competitive objective, since consenting to an invitation to collude can be presumed.

Mastercard[215] seems to allow for a broad understanding of the term decision of association. The more subjective nature of "commonality of interests" leaves the extent of the term somewhat unclear.

While the term agreement has been broadly interpreted, parallelly, the necessity of even a "concurrence of wills" has diminished with the development of the caselaw on concerted practice. *Dyestuff*[216] first held purely indicia to be sufficient to find an infringement. Subsequent caselaw have push the limits of this ruling and shown that even a single meeting or in certain cases, no contact at all have to be shown to find an infringement. Simultaneously, the Court of Justice has tried to strike a balance with the right of undertakings to intelligently adapt to shifting market conditions.

The *single and continuous infringement* doctrine holds increasing importance in the caselaw of the EU courts. While originally serving as a way for undertakings to exarate themselves from involvement in a larger cartel, the following chapter will challenge the extent to which it is applicable.

The importance of the presumptions has already been mentioned. In the following chapters, it will be seen how the core issue is often the extent to which these presumptions can be invoked and what it takes to rebut them.

[215] See C-382/12.
[216] See C-48/69.

4 *Dolus and Culpa* in EU Competition Law

This chapter introduces the inquiry into the variability of dealing with EU competition law in terms of dolus and culpa. In particular, whether dolus and culpa inexplicitly serve as a determining factor within the functionalistic approach adopted by the Commission. Initially, the question of whether art. 101 TFEU requires intent (dolus) will be investigated. Ultimately reaching an answer in the negative, it will subsequently be investigated whether art. 101 TFEU require either dolus or culpa. Thereafter, various scenarios will be approached first by a formalistic approach, then the dolus/culpa-approach, and lastly some reflections will be offered. The possible alternative approach of strict liability will then be discussed. Finally, some initial conclusions are given. The question of dolus and culpa is later revisited and ultimately concluded in Ch. 5.4.

For the entirety of this chapter, it will be important to keep in mind what the dolus and culpa are in relation to. In art. 23 reg. in 2003/1,[217] intent or negligence is already required for the issuing of fines. In that case, the negligence or intent is in relation to the infringement. However, within the discussion regarding art. 101 TFEU, a dolus/culpa requirement would come at an earlier stage. Specifically, it in regard to the criteria of coordination; have the undertaking entered into an agreement, taken part of a decision of association, or concerted practices negligently or intently? *Prima facie*, this question appears to contain a contradiction; an agreement in the traditional sense requires a meeting of the minds; hence, intent naturally follows from the very existence of the agreement. However, the caselaw discussed in the last chapter should be recalled. The Court of Justice has, on numerous occasions, deemed indicia sufficient to find the criteria of coordination fulfilled. Which, in turn, opens the possibility that an agreement or concerted practice is entered into unintentionally. What dolus/culpa is in relation to is further discussed in Ch. 4.2.

4.1 Does art. 101 TFEU Require Dolus?

As the scenario of digital eye was first introduced, the formulation of the problem mainly surrounded the lack of intent between the algorithms. However, since then, it has been questioned whether EU competition law requires intent for finding an infringement.[218]

A quick glance at art. 101 TFEU reveal no such requirement. Further, the courts rarely speak in such terms within its caselaw. As previously discussed, however, the requirement of an agreement, decision of association or

[217] Art. 23, Council Regulation (EC) No 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty

[218] C-204/00 etc. *Cement*, para. 84; C-634/13 P *Total*, paras. 20-26

concerted practice appears to indicate that some sort of consent must be given. Further, while not explicitly using the term "intent", the Court of Justice has utilised terms to a similar effect, e.g. "knowingly"[219], "intentional contribution"[220], etc.

Although the terms should not be confused, the General Court repeatedly ruled that consent is not required for the criteria of coordination to be fulfilled.[221]

Based on the line of caselaw regarding rebutting the presumption that a concerted practice had an anti-competitive objective, it seems to reveal a similar approach towards intent. According to that line of caselaw, an undertaking can be presumed to have an anti-competitive objective even though it objected and/or intended to cheat the agreement/concerted practice, instead only publicly distancing themselves or reporting to authorities is sufficient. If art. 101 TFEU, indeed required intent, is it difficult to see how the Court would be able to find this, while an undertaking had objected and/or shown that they intended to cheat the agreement/concerted practice.

Additionally, it has been argued that the caselaw of the Court of Justice makes it unequivocally that intent is not necessary.[222] The cited caselaw states that intent is not necessary to find that an agreement holds an anti-competitive objective.[223] However, this does not completely rule out the possibility that intent is necessary for the entrance into such agreement. As will be noted and expanded upon in the next Chapter, the criterion of an anti-competitive object or effect is to be objectively determined. Hence, intent is theoretically irreverent for that criterion.[224] This thesis nevertheless holds that the criterion of coordination is subjective, and hence, intent could be required for fulfilling thereof. Regardless, the wording of the Court does suggest that intent is not necessary.

Conclusively, intent does not appear to be needed to find the existence of an anti-competitive agreement/concerted practice.

Disregarding what will be said in the next chapter, instead focusing on traditional competition law infringements, it can be questioned how relevant this conclusion is. In cases of undertakings unintentionally entering into anti-competitive agreements/concerted practices, it is unlikely that a fine would be

[219] C-48/69 *Dyestuff.*

[220] C-444/11 P *Team Relocations and Others v Commission.*

[221] T-83/08 *Denki Kagaku Kogyo Kabushiki Kaisha v Commission*, paras 61-62; T-21/05 *Chalkor AE Epexergasias Metallon v European Commission*, para.72.

[222] See Blockx (2017), p. 7.

[223] See C-551/03 P, *General Motors*, para. 77; C-8/08, *T-Mobile*, para. 27; C-501/06 P etc, *GlaxoSmithKline*, para. 58; C-32/11, *Allianz Hungaria Biztosito*, para. 37; C-67/13 P, *Cartes Bancaires v Commission*, para. 54; C-286/13 P, *Dole Food*, para. 118.

[224] In practice, intent is relevant to prove such an objective; see caselaw cited ibid.

issued. Instead of engaging in a lengthy investigation procedure, the Commission could simply point out the infringement to the undertaking, which assumingly would lead to the undertaking ceasing the unintentional practice.[225]

4.2 Does art. 101 TFEU Require Dolus or Culpa?

In the situations wherein intent does not appear to be required, it may very well be argued that negligence nevertheless is, e.g. undertakings have not intentionally entered an anti-competitive concerted practice if when objecting/intended to cheat, but they have negligently done so by not publicly distancing/reporting to authorities. Hence, it could be argued that while art. 101 TFEU, does not require intent, it does at least negligence.

Initially, why is this desirable *de lege ferenda*? One of the main challenges for EU competition law is to balance the freedom of market players to adopt market policies independently and the efficient enforcement of prohibited practices. Consumers should be protected against unfair practices, while businesses should not be punished for simply adopting themselves intelligently to the reality of the market. As a society, we do not generally want to punish entities without fault. The easiest way to avoid this is to simply put a requirement of fault as a revisit for finding an infringement, a dolus/culpa requirement.[226] While this might be hard to implement in practice, this serves as the theoretical basis for why a culpa/dolus-requirement is desirable.

Besides finding this a desirable *de lege ferenda,* this thesis also holds the view that such a requirement is compatible with the current legislation and jurisprudence *de lege lata.* This reasoning is, on a conceptual level, three-folded.

First, while the EU-Courts have refrained from using the terms explicitly, utilise many terms used to a similar effect; “knowingly” (Dyestuff), “intentional contribution” (Team Relo v Commission), “could reasonably have foreseen it” (Anic), etc. As discussed above, the situations wherein a requirement for intent is not needed can nevertheless be interpreted as containing a culpa requirement.

Second, due to the criminal law elements of competition law, namely the possibility of the Commission to issue sanctions, it can be assumed that some fundamental principles of criminal law apply. In particular, it could be argued that competition law should albeit by the principle of *nulla poena sine culpa*;

[225] Cf. art. 7 reg. 2003/1.

[226] While such a requirement exists already in reg. 2003/1 for issuing of fines, finding an infringement, even without the issuing of fines may result in other sanctions (see e.g. 7) and civil enforcement.

no punishment without fault. This principle is found in art. 48 of the Charter, and an in art. 6(2-3) in ECHR.[227]

Third, a more protracted argument could be made that, as previously stated, *dolus/culpa* is already required for the issuing of fines. As a general principle of law, such intent or negligence should be in relation to the circumstances of the infringement committed.[228] Recalling the four requirements for art. 101 TFEU, it is the only one that is of a subjective nature, that is, the criteria of coordination. The terms "undertaking" and "potential effect on trade between member states" are objective criterion; the intentions of the party is irrelevant when determining whether they are fulfilled. The requirement of "object or effect to the prevention, restriction or distortion of competition" does *prima facie* appear to be of a subjective nature. However, the object or effect is that of the collusive agreement, not that of the parties. An agreement is or is not anti-competitive by its nature.[229] The Court of Justice have, therefore, stated that the requirement is of an objective nature.[230] Hence, when the Commission and the Courts are considering the subjective criteria of dolus/culpa in reg. 2003/1 art. 23, it is in actuality only considering whether the undertaking has intently or negligently entered into an agreement/concerted practice. Although perhaps a stretch, it could be argued the dolus/culpa-requirement in reg. 2003/1 is inseparably linked with the criteria of coordination, and subsequently, it is therefore fair to say that a dolus/culpa requirement exists already at the stage of the stage of coordination criteria.

An analogy borrowing the terms of *culpa/dolus* is in no way an obvious deduction from the regulation and jurisprudence. Since these terms have generally been avoided in competition, it makes for a cumbersome analysis. However, for the reasons laid out, it should at least be a compatible interpretation. It appears feasible to have the criteria as a guiding principle of a functionalist approach. In the next chapter, it will be shown how this simplifies the analysis of unilateral decisions.

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[227] The complicated relationship between the EU and ECHR falls outside the scope of this thesis. In brief terms, the EU is not a party to the convention, but every single member state is, and according to the treaties, the EU has a special relationship to the ECHR, see art. 165, 167 & 220. See further Groussot and Stavefeldt, 'Accession of the EU to the ECHR: A Legally Complex Situation', in: Nergelius and Kristoffersson (Ed.), Human Rights in Contemporary European Law (2015), p. 14.

[228] Recently discussed in C-807/21 *Deutche Wohnen*, paras 75-78, although in relation to data protection law.

[229] The Court of Justice have stated that while not determinate, the Commission may take the parties' intentions into account, see C-501/06 P, C-513/06 P, C-515/06 P and C-519/06 P *GlaxoSmithKline II*, para 58.

[230] See ibid; Case C-551/03 P General Motors v Commission, ECLI:EU:C:2006:229, para 64; Joined Cases 96/82 to 102/82, 104/82, 105/82, 108/82 and 110/82 *IAZ International Belgium and Others v Commission*, ECLI:EU:C:1983:310, para 25; Case C-209/07 *Beef Industry Development Society and Barry Brothers,* ECLI:EU:C:2008:643, para 21.

4.3 Case Study: Hybrid Human-algorithmic

4.3.1 Legal formal approach

In their book, Lianos et al. pose an interesting scenario based on the US case United States *v American Airlines*.[231] In the authors' slightly modified description, one CEO suggests to another to both raise prices by 20%, and the other CEO objects that they are not allowed to talk about prices.[232]

Lianos, Korah and Siciliani go on to explore how a similar scenario would play out under EU competition law, based mainly on the Commission's Guidelines.[233] Let's elaborate on this scenario by referencing relevant legal precedents. The scenario shall be simplified to:

1. An employee (Sender) suggests to an employee at a competing undertaking (Receiver) to collude on prices.

Regarding this first scenario, there is no doubt that, if the price suggestion was put into effect or if the proposal was accepted in some other way, it would constitute an infringement. Price announcements have explicitly been deemed to constitute an infringement.[234] However, the question is what happens if the proposal is rejected or left unanswered. Two questions may be posed:

i. Would a non-affirmative response constitute an infringement?

ii. If yes, can the *Receiver* successfully invoke the *single and contentious infringement* doctrine as a defence?

If rejected there will naturally not be any competition restrictive effect from the alleged concerted practice, however, as clear from *Anic,* it is sufficient with an anti-competitive object, for conduct even without such effect.[235] The test for which, apparent through *Hüls,* seemed to be whether the undertaking acted independently.[236] *In casu*, that is doubtful considering the knowledge of an intended price increase. Reasonably, the Receiver cannot possibly have an anti-competitive object regardless since they objected to the discussions.

[231] See *United States v American Airlines,* 743 F.2d 1114, 1116 (5th Cir 1984).

[232] Lianos et al (2019), p. 432–433, para 3.

[233] Ibid, p. 433-436.

[234] C-40/73 etc. *Suiker Unie*. One exception is if the announcement is genuinely public, see C-189/02 P, C-202/02 P, C-205/02 P to C-208/02 P and C-213/02 P *Dansk Rørindustri and Others v Commission,* , , para. 211; T-249/17 *Casino, Guichard-Perrachon and AMC v Commission*, paras. 263- 267; T-191/98, T-212/98 to T-214/98 *Atlantic Container Line and Others v Commission*, para. 154.

[235] C-49/92 P *Anic.*

[236] C-199/92 Hüls.

However, similar defences have been largely unsuccessful.[237] Further, the presumption in *T-Mobile* places the burden of proof on the *Receiver*.[238] As discussed, a rebuttal of this presumption is generally only possible by public distancing or by reporting to the authorities, which assumably haven't happened.[239] It is questionable if either the exception in Total or in E-Turas is applicable, considering there haven't been any later instances of contact, nor is the number of Receivers unknown. Taken all together, it appears difficult for the Receiver to rebut the presumption, and hence, it is possible (i) should be answered in the affirmative. [240]

Continuing, when invoked as a defence, the *single and continuous infringement* doctrine is normally used to exclude an undertaking from a cartel. From this, it is uncertain whether it is possible to invoke the doctrine when it exclusively involves two undertakings. An answer in the affirmative would lead to an infringement with a sole undertaking and hence call into question the criteria of coordination. Simultaneously, an answer in the negative, with the just mentioned reasoning, would result in the circler argument of the Receiver not being able to rely on the doctrine due to a lack of an underlying collective practice while also being required to prove that the same collective practice did not have an anti-competitive objective. Out of the two the most appealing is the first mention, opting for allowing the Receiver to invoke the doctrine.

If so is allowed, the Receiver could argue that there was no intentional contribution. Although the caselaw has a broad understanding of the term, the burden of proof is, in this case, on the Commission.[241] In effect, this would make the *Sender* solely liable for attempting to collude. *De lege ferenda* this might sound appealing, however, to outright sanction the *Sender* for "attempted collusion" would raise concerns of legal certainty.[242] This considering an "attempt"-infringement is not stipulated in EU competition law. This workaround may however make such an outcome acceptable. In truth, the end result is similar to finding multiple undertakings liable for an infringement only by object.

The Court of Justice is unlikely to apply such a formalistic reasoning, rather, would in all likelihood, apply a functional approach. The easiest solution

[237] Cf C-291/98 P Sarrió, para. 50; C-204/00 P etc *Cement*, EU:C:2004:6, para 85; T-83/08 *Denki Kagaku Kogyo Kabushiki,* paras 61-62; T-21/05 *Chalkor AE Epexergasias Metallon*, para.72.

[238] C-8/08 *T-Mobile.*

[239] C-634/13 P *Total*; C-74/14 Eturas.

[240] The Commission appear to make the same assessment. See Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (2023/C 259/01), paras. 366-435.

[241] Recall Ch 3.4; T-25/95 etc Cement, paras 4027, 4060 4109 & 4112

[242] A similar discussion has held regarding holding undertakings liable as an "accomplice to collusion". The Advocate General reasoned against this due to concerns of legal certainty; finding such infringement would require an explicit statutory provision. See Ch. 3.4, C-194/14 P *AC-Treuhand*, incl. Opinion of AG Wahl.

would be to argue, similarly to Black, that the object of a conduct is only relevant when it is a step towards an anti-competitive effect. Black does nevertheless acknowledge that, as it stands, the standard of evidence would have to be extraordinarily high.[243]

Another possible solution would be to create a new exception, in line with those in *Total* and *E-Turas*; if the Commission has not shown any anti-competitive effects have been shown, it is sufficient to show that the undertaking objected and/or intended to cheat the agreement to rebut the presumption in *T-Mobile*.

Yet another one is to consider that information the undertaking received involuntarily does not suffice to say that the undertaking didn't act independently.[244]

This is far from an exhaustive list of possible functional solutions. It is also possible that the Court simply find the Receiver liable for not reporting/publicly distancing themselves from the suggestion. Nonetheless, the exercises highlight certain difficulties with applying the caselaw from concerted practices. A more elegant solution will be presented in the next Chapter. For now, let's complicate the scenario further:

2. An algorithm[245] (Sender) suggests[246] to an employee at a competing undertaking (Receiver) to collude on prices.

This scenario could be further subdivided into:

(a) If the Receiver accepts

(b) If the Receiver refuses

In (a), there will eventually be an infringement by effect. The question at hand is (1) considering the lack of a "meeting of the minds", whether the Sender-undertaking has entered into an agreement/concerted practice, and (2) if now, instead, the Sender can invoke the *single and continuous infringement* doctrine and claim that there was no intentional contribution. Alternatively, they could also argue that no overall plan exists or that they were not aware of the other cartelists' conduct.[247] As these are similar questions those of fully

[243] Black (2005), p. 160.

[244] Cf. C-40/73 *Suiker Unie*.

[245] For the purposes of this scenario, this is a self-learning algorithm, which the undertaking was not aware could developed the understanding necessary to attempt to collude.

[246] The term is to be understood broadly, could e.g., be a discloser of an intended price increase. However, it is uncontested that Receiver understood the measure as an invitation to collude.

[247] Cf Ch 3.4.

autonomous algorithmic collusion, both questions will be dealt with in Chapter five.

However, for now, consider (b); would the same reasoning regarding the Receiver's liability from scenario 1 still apply? Finding an agreement/concerted practice should presumably be even more difficult, considering there is no intention to enter into such from either party. Nevertheless, the same presumptions should, in theory, apply, and hence, unless some functional solution is applied, the Receiver is only free from liability if he reports/publicly distances himself or if allowed to apply the *single and continuous infringement* doctrine.

In conclusion, similar to (a) the question whether it is sufficient for finding an infringement despite the lack of a "meeting of the minds" will be dealt with in subsequent chapters. Presumed an answer in the affirmative, the scenario does not seem to differ from scenario 1.

Lastly, let's consider the reverse scenario:

3. An employee (Sender) suggests[248] to a competing undertaking (Receiver) to collude on prices. However, the receiving undertaking utilises an algorithm[249] for the setting of their prices.

In a similar faction, to scenario 2, this could be subdivided into separate scenarios depending on whether the algorithm accepts. A scenario where with an acceptance is, again, similar to fully autonomous algorithm collusion and will be dealt with in subsequent chapters. In essence, it is the same as scenario 2a.

Once more, it should be considered if this scenario plays out the same regarding the *Receiver's* liability. It seems unreasonable to appoint any liability. In addition to the lack *prima facie* of any anti-competitive effect or object by the Receiver, there is also a lack of awareness. Furthermore, the algorithm correctly refused to enter an anti-competitive practice. Nevertheless, in theory, the Receiver does again need to rebut the presumption of an anti-competitive objective, which only seems possible through reporting/public distancing.[250] Reporting to authorities, or public distancing might not even within the realm of capabilities for the algorithm, that appears to be the bar.

[248] The suggestion is made directly to the algorithm. For the sake of the argument, how a human, in practice, may make suggestions to an algorithm is irrelevant.

[249] For the purposes of this scenario, this is a self-learning algorithm, which the receiving undertaking was not aware could developed the understanding necessary to attempt to collude. However, the Sender was aware, or at least suspected, such capabilities.

[250] Similarly, to previously discussed, the *single and continuous infringement* doctrine might be invokable. If so, the Receiver could, in addition to the lack of intentional contribution, argue for a lack of an overall plan and of awareness.

4.3.2 Reframing the Question of Unilateral Decisions & Cyborg Collusion

The question of unilateral decision under art. 101 TFEU has, admittedly, been presented in a somewhat simplistic way in this thesis. In order to make the following theoretical exercise, we need to make two presumptions; (1) unilateral conduct can, indeed, constitute a concerted practice,[251] (2) the *single and continuous infringement* doctrine can be applied *in casu*.

With these presumptions, recall the key questions (i-ii) in scenario 1. In (i) the main question concerned whether the Receiver could rebut the presumption in *T-mobile*. Rephasing this question, utilizing the *dolus/culpa*-criterion, would look something like: "Was the Receiver negligent in its conduct". In particular, was there any culpable market conduct subsequent to the Sender's unilateral conduct, and/or was it negligent to not publicly distant themselves/ report the conduct to authorities. *In casu*, reasonable arguments could be made both in the affirmative and the negative and would rely on further details in the individual case. Nevertheless, this framing of the question provides a springboard for easier analysis of the more complex cases.

Now consider, whether there is any difference in scenario 2-3. Presumably, as the causality lessen, it should become more difficult to find *culpa*. From the perspective of the Receiver, is scenario 2 less culpable, due to the invitation to collude was send by an algorithm? Taken as an individual instance, that seems doubtful. Arguably, it is even more negligent considering the Sender is not aware of the conduct of the algorithm. On the contrary, one could imagine an undertaking receiving numerous similar invitations to collude and only failing to report a single or small portion of them. In such a case it could be argued that it is an unreasonable burden to place on the undertaking to report/publicly distance to identify and report every single invitation, as long as there is a general practice at the undertaking to report/public distance.

In scenario 3, the chain of causation to find *culpa* becomes protracted. In order to find *culpa*, one would have to argue it is negligent to not have knowledge that other undertakings could abuse one's algorithm to achive, not an anti-competitive effect (since the algorithm "rejected" the offer), but an anti-competitive objective. In addition, such lack of knowledge must have led the Receiver to negligently have failed to programme the algorithm to

[251] Caselaw clearly point in this direction, see e.g. T-168/01 GlaxoSmithKline; T-13/03 Nintendo: C-260/09 P *Activision v Blizzard*; T-450/05 *Peugoet*, however, it there is no complete consensus in legal doctrine. Further, the concept of "unilateral" could, be expanded upon see discussions in Ch 3.6. Lastly, it is questionable whether unilateral can constitute a concerted practice solely by anti-competitive effect.

report/publicly distance itself from the invitation. The only reasonable conclusion appears to be that the Receiver have not been culpable.[252]

Alternatively, the *dolus/culpa*-requirement could be in place of the *single and continuous infringement* doctrine. That is to say, the *single and continuous infringement* doctrine is, in actuality, an examination of individual fault (*dolus/culpa*). The pursuance of an overall plan, intentional contribution and awareness are certainly reasonable conditions to find fault. This would mean that the collective accountability can be presumed, but the individual accountability must be shown by the Commission. This approach does contain certain issues. Formalistically, the term "intentional" does not appear to suggest that finding *culpa* is sufficient, contrary, it suggests the Commission needs to show *dolus*. Which contradict what earlier have been concluded.[253] Further, it is reasonable to question what the purpose of a *dolus/culpa*-exercise is, considering a more precise exercise already exist.

4.4 Strict liability as an Alternative

An efficient way to eliminate subjective element is to simply hold the undertakings strictly liable. Ultimately, the goal of Competition law is to protect consumers, strict liability would certainly achieve that purpose to a larger extant than most other solutions. This also seem to be the view of the Commission. The then Commissioner for Competition Margrethe Vestager have stated that:

> …businesses also need to know that when they decide to use an automated system, they will be held responsible for what it does. So they had better know how that system works.[254]

Strict liability is not a foreign concept for EU competition law, since it already is strict liability for employees. Essentially, undertakings are responsible for infringement of all their employees, regardless of knowledge and fault of the executive board. Considering the meaning of "undertaking", this also involves employees throughout the entire cooperative group. This has, in caselaw at times, been extended to also include service providers with limited autonomy.[255]

Returning to the original issue, algorithms lack legal personality. Strict liability for employees or contractors rests on the foundation of an underlying proxy, explicit or otherwise. Due to the lack of legal personality, algorithms

[252] Cf. discussion on strict liability Ch 4.4.

[253] See Ch 4.1.

[254] Margrethe Vestager (2017), European Commissioner for Competition. (Speech at Bundeskartellamt 18th Conference on Competition, Berlin, 16 March 2017) (https://ec.europa.eu/newsroom/comp/items/55994/en

[255] See C-413/13, *Kunsten*, paras 35-36; C-293/13 P and C-294/13 P, Fresh Del Monte, paras 75-76; C-542/14 *VM Remonts and Others,* para 27.

cannot be holders of proxies either. Hence, it is questionable if an analogy from this type of strict liability is possible.[256]

There is, in numerous jurisdictions,[257] a different type of strict liability, that of product liability. The manufacturer of products can be held liable for damages his product causes, regardless of fault. Perhaps an analogy from product liability is more suitable. However, this poses the question of who is liable. Imagine that the development of an algorithm has been outsourced to a separate company, both the undertaking utilising and the undertaking designing the algorithm, that the use of the algorithm will have to anti-competitive implications. Which undertaking is liable? According to the concept of product liability, it should be the designer. By alternating the situation further, this would have unreasonable implications. Suppose the designer is unaware of the anti-competitive potential of the algorithm, yet the undertaking using the algorithm is aware, in fact, it intends to benefit from the anti-competitive effects. In such a situation, the designer, under the concept of product liability, could still be held liable.[258] The sole purpose for outsourcing the design process might be to avoid liability.

The concept of product liability is in place to strengthen the position of consumers; it is generally not applicable to pure B2B relations. Further, it relies upon a chain of changes in ownership of the product in question, eventually ending up in the hands of a consumer. When it comes to algorithms, the algorithm itself is not transferred to the ownership of a consumer. All in all, product liability makes for a poor analogy. This does not appear to be the liability the Commission is referring to. In the same speech, the former Commissioner stated that:

> The concept of "data protection by design" … That's also how businesses need to think when they design and use algorithms. They may not always know exactly how an automated system will

[256] On this analogy, see next chapter references to Colombo on liability for algorithm developers.

[257] The function of such various on the jurisdiction for certain jurisdictions, a seller is liable regardless fault in for all contracts (except for when the buyer is at fault) Cf Art. 1645 Code Civil (France); Art. 6:74-75 Burgerlijk Wetboek (The Netherlads). However, all jurisdictions within the Union have product liability due to the Product liability directice, see Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products.

[258] Under tort law in certain jurisdictions. Although, the designer would in most jurisdictions have a claim towards his client (regress). Additionally, again dependent on the jurisdiction, the liability is not exclusive, damages could also have been claimed from the undertaking using the algorithm on other grounds.

> use its algorithms to take decisions. What businesses can – and must – do is to ensure antitrust compliance by design.[259]

The cited paragraph rather points to liability for the implementing undertaking. From the speech, the Commissioner does not appear to refer to either of the previously mentioned sorts of strict liability. Instead, she makes an analogy to EU data protection law and the concept of data protection by design in art. 25 GDPR. The precises implications of which are expanded upon in the preamble.[260] To summarise the essence of which, the responsible entity must take certain measures to ensure better protection.

The Commission have, in recently published guidelines, made clear that algorithmics are under the "direction or control" of the undertaking, and hence, employee liability is applicable.[261] However, this is in relation to horizontal cooperation agreements, and the Commission discuss in terms like those in the *Messenger and Hub-and-spoke* scenarios.[262] It is not certain that same would apply in a digital eye type scenario.

4.5 Conclusion

Usages of the tort/criminal law terminology on fault within competition law while, not entirely elegant, seemingly at least feasible. In these terms, dolus does not seem to be necessary for finding an infringement. Regarding alternative requirements of dolus/culpa, it is more uncertain. The alternative of strict liability does not seem to fit fully either. In this chapter, the case for a dolus/culpa requirement has been made. It has been shown how it simplifies the formal legal approach. This, of course, nevertheless relies on it being an acceptable approach *de lege lata*. In the next chapter, the developed dolus/culpa-requirement run into complications in application. Therefore, the dolus/culpa-requirement will be revisited in Ch. 5.4 and ultimately, a model for dealing with algorithmic collusion will be presented.

[259] Margrethe Vestager (2017), European Commissioner for Competition. (Speech at Bundeskartellamt 18th Conference on Competition, Berlin, 16 March 2017) (https://ec.europa.eu/newsroom/comp/items/55994/en

[260] See p. 77 GDPR.

[261] European Commission, Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements [2023], para 366-404.

[262] Cf. Ch. 2.1.1-2.

5 Digital Eye

There are two potential issues in regard to the situation when two algorithms act independently of each other in an anti-competition manner (the Digital Eye scenario) and art. 101 TFEU: (1) the criteria of coordination/cooperation ("meeting of the minds") and (2) the "hidden" *dolus/culpa*-requirement. Both will be examined in this chapter. Further, possible solutions will also be presented.

For this purpose, the scenario will once again be modified. Both algorithms act independently without the knowledge of the respective undertaking. Henceforth, we will eliminate the distinction between Sender and Receiver. In sum:

4. Two undertakings both use self-learning pricing algorithms. These algorithms, without the knowledge of the respective undertaking, synchronise prices to the detriment of the goals of EU competition law.

Problem with meeting of the minds-requirement is at an initial glance easy to comprehend. Article 101 forbids anti-competitive agreements, explicit or otherwise.[263] In order to enter into an agreement, one must possess a legal personality. Algorithms do not have a legal personality. Hence, conduct exclusively executed by algorithms cannot fall within the scope of art. 101 TFEU.

In one of the very first instances of framing this issue, *Ezrachi and Stucke* consider that the lack of an intent could cause a Digital Eye scenario to fall outside the scope of competition law. As readers may have already deducted, does this thesis does not hold the view that intent (*dolus*) is a necessary requirement to find an infringement of art. 101 TFEU, as *culpa* is recognised as an alternative requirement. Numerous EU legal scholars have also concluded that intent is not necessary.[264]

Nevertheless, a digital eye scenario, such as scenario 4, might still fall outside the scope of art. 101 TFEU. In this chapter, first current caselaw will be applied to the scenario, second the theoretical models presented in Ch. 3.5.4 will be applied, third, a summary of various legal scholars position on similar scenarios will be presented.

[263] In Ezrachi's and Stucke's words: "a concurrence of wills", see Ezrachi & Stucke (2017), p. 1782.

[264] See Ch 4.1 Blockx (2017), p. 6-7.

5.1 Legal Formal Application of Current Caselaw

Finding an agreement in scenario 4 appears impossible since that would require a "consensus of the minds".[265] Therefore, let's turn to concerted practice, starting off with the most basic definition in *Dyestuff*.[266]

Once again, difficulty arises. The problem lies in the term "knowingly. Initially, the term appears to be binary in nature. However, consider if an undertaking knows that a collision is one of many possible outcomes, although unlikely. Qualifying the term could potentially be done with the formerly purposed *culpa/dolus*-requirement. Hence, the formulation in Dyestuff would be understood as negligently risking a collusive outcome. Such formulation would significantly infringe on undertakings' ability to independently adopt their market policy (*Suiker Unie)*.

Approaching the scenario from the opposite perspective, suppose the Commission have managed to produce *indicia* to the extent that the facts point to a collusive agreement as being the only reasonable explanation. This should trigger the presumption in *Zinc producers*.[267] The question then emerges what would be sufficient for the undertakings to rebut the presumption. If it is considered sufficient to point to an algorithm, would that open the door to hind collusive conduct within the black box. Reversely, if it wouldn't be considered as sufficient, the presumption would be impossible to rebut.

Reasoning in a similar manner as during the last chapter, that it might be possible to presume an anti-competitive object is not feasible for the digital eye scenario. The presumption in *T-Mobile is said to be an upper limit* for the extent of the term concerted practices. In that case the objective is presumed due to a single meeting. In a digital eye scenario, no meeting has occurred. Hence, it is unlikely that the Commission will have success in finding an anti-competitive objective.

Applying the *single and continuous infringement* doctrine also appears perplexed. Similar to the last chapter, it's unlikely that the doctrine can be applied without first finding an underlying agreement/concerted practice. Further, even if an agreement/concerted practice, it is questionable if the doctrine can be applied to the extent that every undertaking, or at least all except one, is exonerated since that would call into question the criteria of cooperation/coordination. Since, in our scenario, all undertakings held the same amount of fault, it would appear arbitrarily to hold one liable and the second one non-liable.

[265] Cf Ch 3.2

[266] "…knowingly, substitutes practical cooperation between them for the risks of competition" (C-48/69 *Dyestuff)*.

[267] C-29/83 CRAM v Commission.

5.2 Application of Theoretical Models

In chapter 3.5.4, the models of Odudu and Black were presented. Perhaps these models can offer guidance in which conducts should fall under art. 101 TFEU and which should not.

Odudu first introduced his readers to the *common intention* model. Both in his article and in this thesis, this model has been shown to contain holes. Therefore, it will not be investigated further.

Second, and more interestingly, Odudu introduced the *reduction of uncertainty model*.[268] Considering the economical aspect discussed in Ch. 2.2.2, this model is initially appealing, caselaw have often also appeared to reason in a similar terminology.[269] Hence, let's consider whether reduction of uncertainty is a reasonable requirement for determining what constitutes legal and illegal algorithmic market conduct.

Sharing strategic information to a competitor has already been deemed as an anti-competitive behaviour. There is no obvious apparent reason why this couldn't also be held for autonomous algorithmic collusion. Programming a safeguard against the sharing of such information should be relatively straightforward. Hence, for direct communication of strategic information, Odudu's model works well.

It becomes more complicated with public sharing of the same information. From the Commission's Guidelines and caselaw, we learn that such sharing is in breach of art. 101 TFEU unless it is "genuinely public information".[270] The subjective element is yet again the cause of concern; How can algorithms' conduct be genuinely/dis-genuinely? A possible approach would be to shift the focus from the active party to the information itself. However, information can, depending on the context, be simultaneously pro- and anti-competitive.[271] Furthermore, in the digital economy, especially when using algorithms, price announcements for further conduct need not go as far into the future as those traditionally caught by competition law. Even a pledge to retain a certain price for less than 24 hours might be enough for algorithms to achieve a collaborative outcome.

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[268] See Ch. 3.5.4.

[269] C-172/80 *Züchner*, paras 21-22; C-89/85 etc. *Woodpulp*, paras 59–65. C-8/08 *T-Mobile*, paras 32-35; C-449/11 P *Solway Solex-is*, para 36; C-286/13 P, *Dole Food Company*, paras. 120-122; C-7/95 P *Deere*.

[270] See Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (2023/C 259/01), paras. 387-389. Cf. C-189/02 P etc. *Dansk Rørindustri*, para. 211; T-249/17 *Casino*, paras. 263- 267; T-191/98 etc. *Atlantic Container*, para. 154.

[271] See Commission's discussions in Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (2023/C 259/01).

To summarise the reduction of uncertainty model, does it is offering the most appealing understanding so far. The model significantly limits the scope of the digital eye scenario. Although not quite fully comprehensive, it is well on its way. It further merits a modification of the scenario in order to define the remaining gaps:

5. Two undertakings both use self-learning pricing algorithms. These algorithms, without the knowledge of the respective undertaking, synchronise prices by means of public price announcements to the detriment of the goals of EU competition law.

Continuing, it is worth briefly reviewing Black's model. The problem, again, is the subjective elements. Initially, consider (e) is it the goal of the undertaking or the goal of the algorithm? If the former, its algorithmic collusion would fall outside the scope hence it is questionable if the undertaking has that such goal, and regardless, would (f-g) not hold true.[272] If the latter, how is the goal of an algorithm determined? The algorithm may be programmed to maximise profits, but as seen, Black's model requires a more complex goal, as in the aim of the specific conduct. If the algorithm is trained on deep learning, it might be impossible to figure out why the algorithm chose that specific price. Similarly, it can be questioned what it means for an algorithm to "know" or to "rely upon".

In conclusion, it seems reasonable to dismiss Black's model, given considerable stretching required to make it compatible with the Digital Eye scenario. Such significant alteration or broad reinterpretations of the model weaken it to the point where its utility becomes difficult to discern.

5.3 Scholarly Writing on the Digital Eye

The Digital Eye scenario stems from Ezrachi's and Stucke's writings. In their book *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy*, they introduce the scenario in broad terms without going too closely into the implementation for any particular jurisdiction. Since then, multiple scholars have contributed to the debate, reaching a wide range of conclusions. In the following, certain writings on the implications for EU competition law will be discussed.[273]

Blockx, an early and continuous contributor to the debate, can generally be seen to be of the view that EU competition law is already fit to deal with algorithmic collusion. Commenting on Ezrachi's and Stucke's framing of the problem, he notes that EU competition law does not require intent.[274] Fitting

[272] It could be argued that it is sufficient that another algorithm "knows", whatever that means. In my opinion such interpretation of the model weakens it further, to an extent whereas it loses it purpose.

[273] For other jurisdictions, do consult: Van Uytsel et al (2023), Ch. 4-7.

[274] Blockx, (2017), pp. 4-5.

Blockx's reasoning into the terminology used in this thesis, the closest concept would be strict liability. Using an analogy from the concept of *special responsibility* under art. 102,[275] he believes undertakings have a duty to monitor their business relations in order to ensure compliance with competition law.[276] Again noting on tort law terminology, it could be argued that this is a dolus/culpa requirement; if the undertaking can show that it has to a reasonable extent monitor its business relations and have not nor should have found the anti-competitive practice does it fall under art. 101 TFEU? While interpreting Blockx, Van Uytsel write "this obligation means that the undertaking should take necessary steps terminate collusion from the moment she is aware of the colluded price setting."[277] Read *e contrario,* an undertaking is not liable unless it is aware (ought to be aware(?)) of the colluded price setting.

Van Cleynenbreugel proposes a rather distinct solution. In regards to self-learning algorithms used on digital platforms,[278] he considers whether retailers on the platform can be held accountable if the algorithmically operated platform produces an anti-competitive outcome, in the most extreme case, without the retailer's knowledge. A retailer simply poses their product to the platform and agrees, explicitly or otherwise, to give the platform a certain freedom in the setting of the price. Van Cleynenbreugel argues that following *Mastercard inc*, the concept of commonality of interests could be applied. According to his argument the common interest *in casu* would be a desire to maximise profits. Hence, the platform is taking a decision on behalf of the retailers and the collusive practice falls under decision of association of undertakings, and sequentially art. 101 TFEU.[279]

Van Cleynenbreugel's reason is certainly appealing and seemly sound. However, it's far from established caselaw. Initially, in *Mastercard Inc,*[280] the Court did a broad assessment of the facts and considered the commonality of interest as sufficient only in combination with the *de facto* retained decision-making powers. A commonality of interests is not by itself sufficient:

> …the criterion of the existence of a commonality of interests… in recalling in that context that 'it follows from the case-law of the Court of Justice that the existence of a commonality of interests or a common interest is a relevant factor for the purposes of assessing whether there is a decision by an association of

[275] Originally mentioned in C-322/81, *Nederlandsche Banden Industrie Michelin v Commission*, para. 57.

[276] Blockx (2017), pp. 8-9.

[277] Van Uytsel, S. (2023). "Chapter 1: The algorithmic collusion debate: a focus on (autonomous) tacit collusion". In Algorithms, Collusion and Competition Law. Cheltenham, UK: Edward Elgar Publishing, p. 27.

[278] In theory does his argument hold true for any other intermediary for that matter, physical or digital.

[279] See Van Cleynenbreugel, P. (2020).

[280] C-382/12 *Mastercard Inc*; T-111/08 *Mastercard Inc*.

> undertakings within the meaning of Article 81(1) EC', the General Court did not seek to impose a general criterion, much less an exclusive criterion.[281]

Additionally, following the *Mastercard Inc. case, there have been no judgments* from the EU courts suggesting that a commonality of interests can be applied in the manner that Van Cleynenbreugel suggest.

Upon the liability of an independent algorithm developer, Blockx holds that they can be held liable as a facilitator.[282] Colombo, with reference to *VM Remonts,*[283] however argues that under certain conditions, a developer acting on instructions of undertakings should not be held liable.

Colombo suggests that the Court of Justice's stance on service providers in *VM Remonts*[284] might serve as a general framework for algorithms. The argument is based on the possibility of drawing an analogy from the three alternative criteria outlined: an undertaking is liable if (1) the service provider (algorithm) is effectively under its direction or control, (2) it has awareness of the anticompetitive objectives pursued by both the competitors and the service provider (algorithm), along with an intention to contribute to these objectives through its conduct, or (3) being able to reasonably foresee the anticompetitive effects and being willing to take the risk.[285]

However, without adjustments, the first criterion, similar to the concerns discussed regarding employer liability, could have broad implications. Even if an algorithm is under the effective control of an undertaking, its opaque nature may render detecting any anticompetitive objective virtually impossible.

Noteworthy is the opinion of Advocate General Wathelet, who suggests presumption, holding the undertaking liable regardless of knowledge and consent, rebuttable by the undertaking proving it was unaware of the anti-competitive objective and had taken necessary precautions of prevention.[286] This is arguably a more suitable analogy for algorithms.[287]

Circumventing the statutory requirements for dolus/culpa, Blockx suggest that the Commission could use sanctions other than fines to deal with algorithmic collusion. In a situation not dissimilar to scenarios 4-5 in this thesis, Blockx points to article 7 in reg. 1/2003., which allows the Commission to

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[281] C-382/12, para. 73.

[282] Blockx (2017), p. 9.

[283] See C-542/14; Colombo N, 'Virtual Competition: Human Liability vis-À-vis Artificial Intelligence's Anticompetitive Behaviours' (2018) 2(1) CoRe 11-23.

[284] See C-542/14

[285] See Colombo (2018), pp. 16-17

[286] See C-542/14 *VM Remonts,* Opinion of AG Wathelet, paras 63-65; Colombo (2018), p. 17.

[287] Cf. The model proposed in Ch 5.4.

order an infringement to cease.[288] This can further be combined with remedies, such as periodic penalty payments in art. 24.

Calzolari suggests a similar approach, although lean towards using art. 9 of the same regulation.[289] The difference lay in the need to find an infringement. Article 7 requires an infringement, hence the problem of satisfying the criteria of coordination once again arise. On the contrary, there is no such requirement in article 9, rather it is sufficient with a competition concern. Article 9 is regarding commitments, which in principle should be offered by the undertaking, Calzolari however, holds that the Commission, can and have, effectively invited commitment offers. Whilst the Commission cannot design commitment agreements on its own, when negotiations have started, the Commission may dictate the negotiations to effectively achieve such an outcome.[290]

Implementing Calzolari's proposal as a general practice could result in numerous issues. Initially, if it would be well-established that the Commission were unable to find an infringement in Digital Eye scenarios, the undertakings can simply refuse to enter negotiations. Even if the practice was successful, it would do significant harm to transparency and legal certainty. Additionally, it could significantly add to the Commission's workload. If there is no risk of an actual remedy, as long as you accept the commitments from the Commission, there is no incentive to avoid algorithmic collusion, hence it can be expected to be a more frequent occurrence and the Commission would need to reach a negotiated outcome in each and every instance.

A reoccurring suggestion in instances where EU competition law runs into complicated issues is to adopt the US rule of reason approach. For algorithmic collusion, the perhaps most prominent rule of reason model has been suggested by Gal.[291] She suggests a limited rule of reason approach based on the following three questions:

> Does the algorithm facilitate or strengthen in a non-negligible way the ability to reach or maintain a jointly profitable market equilibrium?
>
> [If] no, [then] legal
>
> [If] yes:
>
> Is the use of the algorithm justified by neutral or procompetitive considerations?
>
> [If] no, [then] illegal

[288] Blockx (2017), pp. 9-11.
[289] Luca Calzolari (2021).
[290] Ibid, 1221.
[291] See Gal, Michal, 'Algorithms as Illegal Agreements' (May 2, 2018), Berkeley Technology Law Journal, Forthcoming.

[If] yes:

Do these considerations outweigh the algorithm's coordination-facilitating effects, and are the latter needed in order to enjoy the former?

[If] yes, [then] legal

[If] no, [then] illegal.[292]

The model isn't specifically tailored for EU law, rather it's a general test for distinguishing between beneficial and damaging algorithms. It is worth questioning how different this test really is from existing EU legislation. Question 2-3 is essential the same test as the Commission apply for art. 101 TFEU(3). Further, question 1 is similar to the uncertainty approach suggested by Odudu, discussed in previous chapters. Admittedly, Gal's test appears to have a slightly broader scope. All in all, it is hard to see how the approach contributes to EU competition law.

5.4 Conclusion: Revisiting Dolus/Culpa

In concluding this chapter, considerations will be given to whether the envisioned dolus/culpa-requirement, considering the cited caselaw and literature, remains a suitable approach for dealing with the digital eye scenario.

The view of the Commission of strict liability appears to be contrary to such a requirement. Multiple other credible sources also seem to argue for strict liability when it comes to algorithms. Hence, the outlooks for this approach are rather tame.

Additionally, applying dolus/culpa to algorithmic collusion has an inherent flaw; algorithms cannot have *mens rea.* Finding fault for a human will also be difficult considering the functioning of black box algorithms. It is possible that an undertaking colludes without knowledge of it.

However, as has been pointed out, although prima facie most sources argue for strict liability, at closer examination, the sources open up the possibility to excoriate the undertaking of fault. Blockx seems to be open to the idea of a rebuttable presumption when an undertaking has taken sufficient steps to monitor the situation.[293] Analysing the caselaw on liability for 3rd parties, Colombo suggests the jurisprudence can be used as an analogy for liability for algorithms.[294] Alternatively, advocate general Wathelet suggests a rebuttable presumption.[295]

[292] Ibid, p. 39.
[293] Black (2017), pp 8-9.
[294] Colombo (2018), pp. 16-17.
[295] C-542/14 *VM Remonts*, Opinion of AG Wathelet, paras 63-65.

There exists a tort law concept which rather neatly captures the ideas just described, that of *duty of care*. The concept implies an obligation to albeit by a certain standard of care, in order to minimise the risk of foreseeable harms. An undertaking can, therefore, be held liable for an act it didn't cause, yet failed to take sufficient precautions to counteract. Applied to algorithms, undertakings are obligated to take reasonable measures to limit the risk of foreseeable harm to competition. The dolus/culpa-requirement is, hence, alive and well, although the dolus/culpa is in relation to this duty of care; has the undertaking been negligence in its obligation to take reasonable care?

In developing the definition of "reasonable care" more closely, let's first turn to what could constitute such requirements. First, naturally, an algorithm cannot intentionally or knowingly be developed to be collusive. We could call this a *per se* infringement. Second, reasonable care should likely involve an obligation of examination (Ge. Untersuchungspflicht); the undertaking may not be ignorant. If developing an algorithm, an undertaking would have to take steps to examine potential competition risks with their algorithm. To reverse the burden of proof, the undertaking would have to show that such steps were taken and that no competition risks were found. Third, if the definition were to be extended further, one could imagine a duty to take preventive actions against algorithmic collusion. What this measure exactly would demand of the undertaking would have to be established reasonably in Commission guidelines. However, examples could include setting up redlines, e.g. an algorithm can never share future pricing information, or organising internal systems, e.g. if prices are updated within a very brief period of another undertaking updating theirs.

Reasonable objections to this approach can be made on the basis that it is redundant. Such objections could come from at least four distinct perspectives.

First, it could be argued that the need for dolus/culpa has already been circumvented by using article 7 or 9 in reg. 1/2003, as suggested by Blockx and Calzovari, respectively. However, in regard to article 7, there is still the requirement for an infringement, the approach argues that, in a digital eye scenario, there is no agreement between the undertakings unless they been at least negligent in their duty of care. Additionally, Blockx acknowledges that using article 7 is a "last resort".[296] In regards to the usages of article 9, the possible negative implications of such an approach have already been described in previous chapters.

Second, it could be argued that it is essential to a disguised rule of reason approach. The term rule of reason does, due to the jurisprudence US court, hold a particular meaning within US anti-trust law sense. However, within an EU competition law, the term lacks such specific meaning and hence needs

[296] Blockx (2017), p. 11.

to be further defined. Fundamentally, it means to restrain from finding a conduct to be an infringement unless it unreasonable restricts competition. This is evaluated on a more subjective basis than the traditional legal formalism that dominates in EU competition law. In that sense, the presented dolus/culpa approach can be argued to be a rule of reason approach, however, so too could numerous other distinct approaches.

Third, a fair critic could argue that this approach doesn't contribute anything new to the debate. Essentially, it is simply a rewording of previously presented suggestions. Contrary to the prior objection, which holds that the approach is a specification of an existing concept, this objection holds that the approach is a generalisation of existing concepts. Finding a sort of smallest denominator for various suggestions of different scholars. The objection indeed holds true in the sense that the approach would require further specification of what "reasonable standard of care" and "foreseeable". Even so, I do not find this to be a redundant exercise. Any theoretical model of legal concepts has, to an extent to be general. Whilst it is true that certain discussed models are more specific, the different models do not entirely overlap. The exercise of finding a common denominator gives a framework for future development of caselaw, in this case in the meaning of "reasonable standard of care" and "foreseeable".

Fourth, it could be argued that the model runs contrary to the Commission's guidelines on horizontal cooperation agreements. As mentioned, those guidelines rely on examples different from the digital eye scenario. While it could be argued that the Commission meant to cover all algorithmic collusion, there is good reason not to jump to that conclusion. These examples that are comparable to the *messenger* and *hub-and-spoke* scenarios[297], contain a subjective element of fault. The reasons why fault could be relevant have been discussed extensively in Ch. 4. The undertakings are essential, only using algorithms as a tool to hide collusion. Additionally, the Commission examples are based on the undertakings using one and the same algorithms. In a digital eye scenario, when each undertaking has deployed its own algorithm, it contains a higher degree of independent market behaviour, cf. *Suiker Unie*.[298] In *de lege ferenda* terms it is the reason to extend the scope that it could damage the development of algorithms. If undertakings are responsible, regardless of fault, the undertaking either needs to be entirely certain no competition harms could arise or willing to take the risk. This risk assessment is highly uncertain due to the nature of black box algorithms. Hence, it is doubtful that companies would take such a risk.

In conclusion, a model can be formulated as follows: An undertaking, deploying an algorithm, has committed an infringement of art. 101 TFEU, if it has failed to take reasonable care to prevent foreseeable competition harms

[297] Cf. Ch. 2.1.1-2.
[298] Cf. *Suiker Unie*

caused by the deployment of the algorithm. Effectively, this puts a burden of proof on the undertaking to show that it has indeed taken reasonable care. Returning to the *prima facie* incompatible view of the Commission, it now appears remarkably in line with this model. The concept the Commission is referring to, that of "compliance by design", does in the GDPR essentially function in the same way as "data protection by design" (art. 25 GDPR). An undertaking must show that they have taken steps to limit risks, implement good practices, etc. Subsequently, this model does not seem to run contrary to any of the views presented in this thesis.

6 Discussion

6.1 Suggestions outside art. 101 TFEU

Within legal research, naturally every problem is a legal one, however, every solution is not necessarily one of altering legislation or jurisprudence. Within and beyond legal research, numerous other solutions have been proposed. In the following, a brief introduction to these will be given.

Numerous solutions go along the line of *if you can't beat them – join them,* using algorithms to combat algorithms.

Firstly, the potential of digital butlers (alt. digital assistants) has been discussed.[299] A digital butler is an algorithm that purchases the desired products on behalf of buyers. This achieves a few different purposes. Initially, it fully utilises the additional transparency bought by the digital market by scouring the internet for the best prices. Furthermore, it counteracts personalised pricing.[300] Since the purchaser is not a human but an algorithm, the selling algorithm has no personal data to base its pricing on. Lastly, it benefits from collective bargaining power, attempting to achieve more favourable deals by purchasing larger quantities and at more opportune moments. The general-purpose digital butlers, such as Amazon's Alexia, have largely failed to achieve the desired benefits so far and have, in themselves, been plagued with competition concerns. How there has been some success with branch-specific digital butlers; for example, have digital butlers been used to recharge electrical vehicles at opportune moments, buying electricity when at its lowest rates? Also, in the electricity market, digital butlers have been used to monitor the prices of various suppliers, automatically switching suppliers when a new one becomes cheaper.[301]

Secondly, it has been suggested that competition watchdogs can use auditing algorithms. Stanford's Human-Computer interaction group have defined audit algorithms as:

[299] Originating from Gal, Michal S. and N. Elkin-Koren (2017), "Algorithmic Consumers", Harvard Journal of Law and Technology.

[300] The concept of personal pricing has generally been disregarded in this thesis, since it is more connected to art. 102, but is the practices of firms using algorithms and big data to set individual prices for each consumer. This is the hope that the firm will achive higher profit margins.

[301] On this, see Théate, T., Mathieu, S., & Ernst, D., 'An Artificial Intelligence Solution for Electricity Procurement in Forward Markets' (2020) Energies 13(23), 6435.

> …a method of repeatedly and systematically querying analgorithm with inputs and observing the corresponding outputs in order to draw inferences about its opaque inner workings.[302]

Essentially, algorithms can be used to find patterns in other algorithms, that may reveal its function, even when the code itself is incomprehensive to a human programmer. This could be a potentially useful tool for competition authorities investigating algorithmic collusion. Alternatively, perhaps this could contribute to the understanding of the extent of the term "foreseeable" in the approach suggested in Ch. 5.5.

Thirdly, and most radically, it has been suggested that competition authorities could disturb market equilibriums to combat algorithmic collusion. Virtually, this function is such that a competition authority conveys one of the undertakings in the cartel to implement a disruptive price strategy. This in turn will trigger the other algorithms to retaliate and subsequently the cartel is dismantled. Although an extension of the current capabilities, the Commission already have wide-reaching competencies within its leniency program. Thus, it is thinkable that the Commission could be granted such competency.

Lastly, the concept of *Explainable AI* should be touched upon. Slightly simplified, explainable AI is the opposite to Black box AI, that is, AI that can be understood by a human programmer. It is an ongoing field of research attempting to achieve explainable AI in two distinct ways: (1) by developing stronger and better algorithms without the Black box and (2) by developing methods in an attempt to better understand black box algorithms.

This seems to be held in high regard for the Commission, considering the cited speech by the commissioner. Although, at first glance, appealing, explainable AI is far from as powerful as Black box AI. By, at least effectively, requiring explainable AI, the Commission risks stuning the development of AI within the Union. Restraining the benefits from algorithms is expanded upon in the next chapter.

6.2 Benefits of Algorithms

Despite all the potential harm and concerns discussed in this thesis, it is worth remembering that most scholars, legal or otherwise, would agree that algorithms ultimately are a force of good.

Algorithms have been shown to promote market entry. When a new market player is able to offer their products using algorithms, they achieved greater

[302] Danaë Metaxa, Joon Sung Park, Ronald E. Robertson, Karrie Karahalios, Christo Wilson, Jeff Hancock and Christian Sandvig (2021), "Auditing Algorithms: Understanding Algorithmic Systems from the Outside In", Foundations and Trends® in Human–Computer Interaction: Vol. 14: No. 4, p. 288.

success than in traditional markets.[303] Consequently, this produces a dynamic effect, forcing companies, old and new, to innovate.[304] Further, as seen while discussing digital butlers, algorithms can be used to utilise the transparency of the digital markets, e.g. price comparison sites. Additionally, digital butlers and similar technologies lower switch costs between suppliers.

In manufacturing, shipping, distribution and more (supply-side), algorithms are used to achieve higher efficiency, greater quality, and lower cost of production, which in turn yields better products and lower prices.

6.3 Research Questions Revisited

6.3.1 Key Concepts in EU Competition Law

The Court of Justice has developed an extensive line of caselaw for collusion. A highlight of key concepts will inevitably result in increased importance being placed on the concept relevant to the following analysis. That being said, in this thesis, certain key take-aways have been presented.

Considering the criteria of coordination holistically has appeared more suitable than treating them as distinct alternative terms (agreement, decision of association and concerted practice).

It is crucial to recognise the fundamental significance of this concept in competition law. While certain behaviours are prima facie excluded from art. 101 TFEU, presumptions have been constructed by the Court of Justice to bring ostensibly legal conduct within the scope of an art. 101 TFEU infringement.

The comprehensive interpretation of the alternative terms has led to a wide scope but simultaneously left the terms somewhat ambiguous, e.g. "commonality of interests", "overall plan", etc.

Since the *Dyestuff* precedent, it has been clear that purely indicative evidence of collusion is sufficient to find an infringement. Following caselaw have showing that even a single meeting is sufficient. In other cases, even without contact between the parties, the Court has found an infringement. While continuously extending the scope, the Court of Justice has earnestly attempted to

[303] OECD (2016a), "Competition and Innovation in Land Transport", https://one.oecd.org/document/DAF/COMP/WP2(2016)6/en/pdf.; OECD (2016b), "Protecting and Promoting Competition in Response to 'Disruptive' Innovations in Legal Services", https://one.oecd.org/document/DAF/COMP/WP2(2016)1/en/pdf; OECD (2016c), "Refining Regulation to Enable Major Innovations in Financial Markets", https://one.oecd.org/document/DAF/COMP/WP2(2015)9/en/pdf.

[304] OECD (2015), Data-Driven Innovation: Big Data for Growth and Well-Being, OECD Publishing, Paris.

balance the efficient enforcement with the undertakings' right to adapt to market conditions.

As the *single and continuous infringement* doctrine gained prominence, it has arisen ambiguity surrounding the extent to which it can be applied. This thesis reaches no conclusive outcome, although it has been explored how it fits into human-algorithm hybrid collusion.

6.3.2 Digital Eye Scenario under art. 101 TFEU

The digital eye scenario certainly poses challenges for EU competition law. However, to definitely say that such a scenario would fall outside the scope of art. 101 TFEU appears to be an unfounded conclusion. The caselaw of the CJEU has proven to be flexible, especially through the functionalist approach adopted. Digital eye could, by the Court discretion, most certainly be brought within the scope of art. 101 TFEU. Less certain is whether this is always entirely desirable. It is uncertain what such legal reasoning would look like. By attempting to apply the caselaw in a formalist manner and by applying theoretical models of the concept of concerted practices, it is possible to form an idea of the difficulties in application. Additionally, various legal scholars have also presented their reasoning for algorithmic collusion under art. 101 TFEU. All of which appear, in themselves to various extents, possible to fit within the jurisprudence of the CJEU. Nevertheless, it remains uncertain which approach the Court will actually use.

6.3.3 Model of Dolus/Culpa in EU Competition Law

Except for being a requirement for issuing of fines under reg. 2003/1, EU competition law never explicitly requires *dolus/culpa*. Additionally, many commentators have been critical towards talking in terms of intent for the field of law. To some extent, this thesis shares the opinion of these commentators, namely that EU competition law does not require intent.

While this thesis is not completely able to show that *dolus/culpa* is *de lege lata* a requirement for finding an infringement, it has highlighted several reasons that point to *dolus/culpa* in fact and *de lege ferenda* being a crucial element of the functionalist approach adopted by the EU courts, when determining the scope of concerted practices. In that sense, the tort/criminal law terminology of fault is, to an extent, meaningful in the discussion of EU competition law.

A model was, indeed, possible to formulate on the basis of the tort/criminal law terminology of fault. Borrowing from the concept of "duty of care", a model for finding an infringement for algorithmic collusion could formulated as follows: An undertaking, deploying an algorithm, has committed an

infringement of art. 101 TFEU, if it has failed to take reasonable care to prevent foreseeable competition harm caused by the deployment of the algorithm.[305]

It is worth noting, similar to what Van Cleynenbreugel has pointed out, that the aim is not developing a line of reasoning for outright prohibiting the use of algorithms. As discussed, algorithms can bring many benefits to consumers. Rather, the aim is to develop a model that distinguishes between harmful and beneficial algorithms while retaining an acceptable degree of legal certainty.[306] The model presented in this thesis hopefully takes a step in that direction. Further clarification on the meaning of the terms "reasonable care" and "foreseeable" would be needed.

6.4 Concluding remarks

Embarking upon the process of this thesis involved the risk that the topic ultimately was theoretical, or in harsher words, "science fiction", both in regards to using the tort law terminology and in regards to a type of algorithmic collusion not yet observed under real market conditions. Reflecting on the findings, the risk was to an extent realised, the discussion was indeed, in some way theoretical.

However, the terminology did turn out to be at least not incompatible with competition law and even useful for the development of a model. Discussions on the digital eye scenario, meanwhile, provided a perspective to question the relevance of subjective elements within art. 101 TFEU.

Lastly, it should be posed that although from a competition law and economic perspective, it appears unlikely that algorithms ever could act in a digital eye scenario manner. Within the field of AI, overcoming "impossible" barriers, is a common occurrence; algorithms could never learn to play chess – until they beat the best of us, algorithms could never drive cars – until they did, algorithms could never imitate human creativity – until they started composing songs and writing novels. The dystopian view of a digital eye scenario is in no way inevitable, yet that does not make the topic irrelevant.

[305] In terms of *dolus/culpa*: An infringement exists if an undertaking negligently or intentionally, has failed to prevent foreseeable anti-competitive outcomes. These alternative formulations should be understood as synonymous.

[306] Cf. Van Cleynenbreugel (2020)

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