

AIRCRAFT DESIGN AND SYSTEMS GROUP (AERO)

Aviation Ethics – Growth, Gain, Greed, and Guilt

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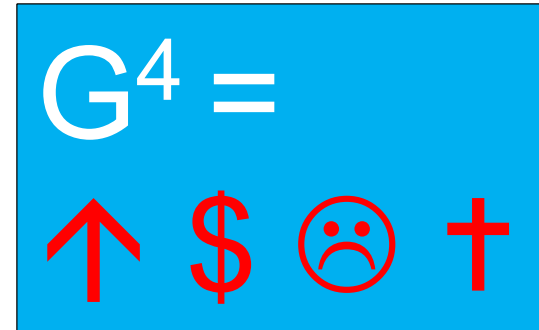
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Aviation Ethics – Growth, Gain, Greed, and Guilt

Abstract

Purpose – Reach awareness that the aviation industry tends not to abide by the law and tends to apply unethical business practice.

Approach – Information is reviewed via the Internet, this includes media information.

Findings – Cases have been found showing a ruthless industry behavior accumulating guilt in the end. At times, obedience to the law is not even shown when the law is strongly enforced to the detriment of the company.

Research limitations – Information was only collected from the Internet. No insider information is used. No attempt has been made to analyze cases in detail, but rather to elaborate an overarching pattern.

Practical implications – Learning from past action of aviation organizations may result in a realistic view based on suspicion.

Social implications – The discussion about the behavior of aviation organizations opens up the topic beyond aviation expert circles.

Value – This seems to be the first philosophy based summary of the topic.

Contents

- **Background / Definitions**
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- **Summary / Recommended Reading**

Background

Background

- Teaching "Aerospace Philosophy" – a one-day course.
- Including critical thoughts in my everyday lectures:
Aircraft Design, Flight Mechanics, Aircraft Systems.
- My own investigations:
 - Aircraft Cabin Air Contamination (<http://CabinAir.ProfScholz.de>)
 - Flying During the Corona Pandemic (<http://corona.ProfScholz.de>)
 - ICAO Annex 16, Environmental Protection, Volume III,
CO2 Certification Requirement (very questionable!)

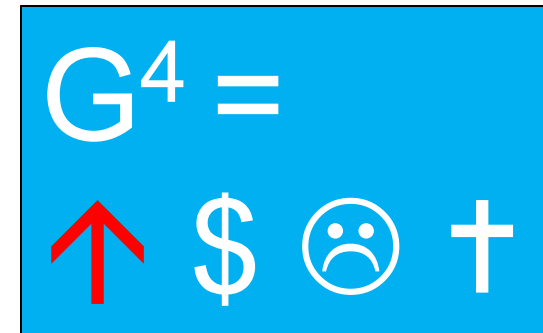
Definitions

Definitions

(Revenue) **growth** is the increase (or decrease) in a company's sales from one period to the next. It shows trends in the business.

<https://www.business-literacy.com/financial-concepts/revenue-growth>

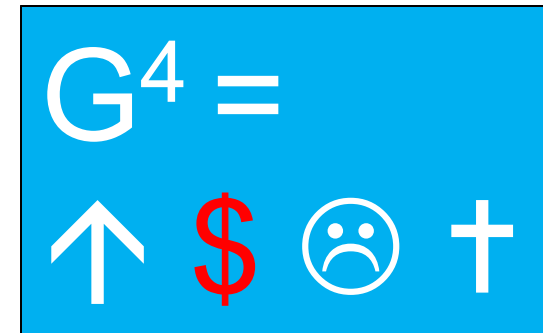
German: **Wachstum** (der Umsätze)



Definitions

An exchange profit or a favorable stock price change leads to a **gain**.
 A **profit** is similar: the difference between revenues and expenses

German: **Gewinn**

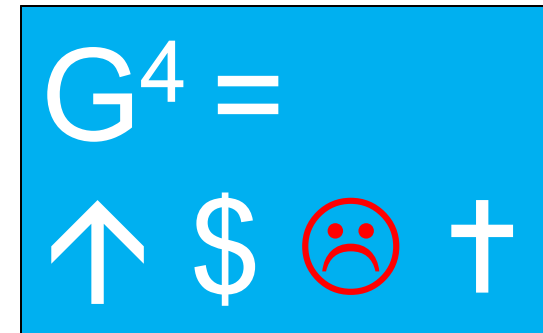


Definitions

Greed: A selfish and excessive desire for more of something (such as money) than is needed.

<https://www.merriam-webster.com/dictionary/greed>

German: **Gier, Habsucht**



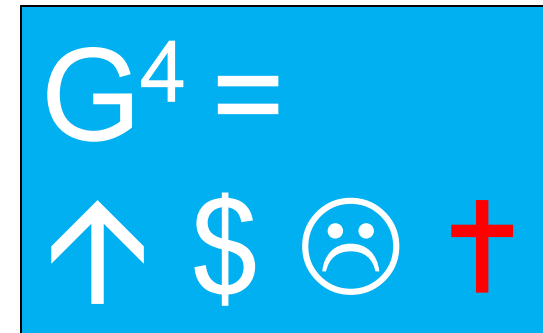
Definitions

Guilt: the fact of having committed a breach of conduct especially violating law and involving a penalty.

<https://www.merriam-webster.com/dictionary/guilt>

German: **Schuld**

The symbol † stands for the highest guilt, to have caused the death of a person.



Philosophy

Philosophy – Hierarchy

The philosophy is divided into two main fields:

- **Theoretical philosophy** *includes* **logic, metaphysics, epistemology, and philosophy of science**. It becomes more practical as it specializes into the philosophy of particular sciences *with* **philosophy of technology, philosophy of engineering** and finally **aerospace philosophy**.
- **Practical philosophy** *includes* **ethics** divided into
 - o normative ethics (e.g. Kantianism) and
 - o **applied ethics** *with* **business ethics** (e.g. corporate practice, profit-maximizing, non-economic concern).

Philosophy – Business Ethics

Business ethics regulates details of behavior that lie beyond governmental control (i.e. not controlled by laws and regulations).

The opposite: "unethical business practice". It *includes*:

- **contract violation**,
- **anticompetitive agreement** to raise the price,
- **conspiracy** against the public,
- **deceitful practices**,
- ...

Danger to run into this **negative sequence**: $G^4 = \uparrow \$ \text{☹} †$

Continuous **growth** to increase **gain** to satisfy shareholders expectations can lead to **greed** and to an ever more ruthless industry behavior accumulating **guilt** in the end.

Infamous examples ... later.

Philosophy – CSR

More than in the past, corporations put increased effort into defining their **philosophical foundation** called **Corporate Social Responsibility** (CSR)

Airbus starts with **Sustainability**, broken down into

- **Environment**
 - Decarbonization
 - Product Responsibility
 - Sustainable Supply Chain
 - Future Aircraft
- **Health & Safety**
- **Human Rights**
- **Corporate Citizenship**
- **Inclusion & Diversity**

<https://www.airbus.com/company/sustainability.html>

Philosophy – CSR Pyramid




Carroll's pyramid of Corporate Social Responsibility (CSR)

<https://doi.org/10.1186/s40991-016-0004-6>

Philosophy – Cascade of Obedience to the Law

Possible **hidden company policies** related to **legal responsibilities** as part of **business ethics**:

- 
- 1) abide by the **law**, only if it is **enforced** to the **detriment** of the company
 - 2) abide by all **law** that is **enforced** (even if punishment is mild)
 - 3) abide by all **law** (enforced or not)
 - 4) abide by the **law and the code of respectable businessmen**
(German: Verhalten als "ehrbarer Kaufmann").

better behavior

Business Ethics Case Studies

Case Study: Ford Pinto (The Classic Case of CSR Failure)

- The Pinto's design positioned its **fuel tank** between the rear axle and the rear bumper.
- Ford Pintos were consumed by **fire after** low-speed rear-end **collisions**.
- Engineers did a cost–benefit analysis:
 - Ford estimated the **cost** of fuel system modifications to reduce fire risks to be \$11 per car across 12.5 million cars for a total of **\$137 million**.
 - The design changes were estimated to save **180 burn deaths and 180 serious injuries** per year, a benefit to society of only **\$49.5 million**.
 - Therefore, nothing was done!
- **Ford was blamed** for callously **trading lives for profits**.
- Approximately 117 lawsuits were brought against Ford.

https://en.wikipedia.org/wiki/Ford_Pinto

Compare the following aviation cases with this "classic" one!

Case Study: Airbus – € 3.6 Billion Penalty Due to Bribery

- "Airbus has agreed to pay a € 3.6 billion fine to **settle multiple investigations from French, UK and US.**"
- A "€ 3.6 billion penalty imposed through a deferred prosecution agreement to settle allegations of **failure to prevent bribery** in a number of commercial and military aircraft deals."
- Airbus used **third-party intermediaries**, working on commission, to assist with sales campaigns.
- Airbus admitted that "it **could be excluded from** government or other **contracts** for some time." The company could take a major hit affecting aircraft sales and cash flow. "In the worst case, the total future **revenue at risk** could exceed **€200 billion.**"
- "We want this **[fully-compliant policy] to be the norm** and I observe that there are many, many regions of the world where the majority of players want to go in that direction" says Faury.
- "We'll make sure we are visible as a company **working with compliance**, with **rules** and **regulations**".

Sources: **flightglobal.com**: **Archived at**: <https://perma.cc/MC88-BZUQ>, <https://perma.cc/U7Y8-GJSS>
<https://perma.cc/6F8V-ANTA>, <https://perma.cc/Z999-SB2W>,
handelsblatt.com: **Archived at**: <https://perma.cc/N85T-JUDF>

Case Study: Boeing – B737 MAX

- In March 2019, the Boeing 737 MAX passenger airliner was grounded worldwide after **346 people died in two crashes** on October 29, 2018 and on March 10, 2019.
- In November 2018 Boeing revealed the MAX had a new automated flight control, the **Maneuvering Characteristics Augmentation System (MCAS)**. **Boeing had omitted any mention of the system from the aircraft manuals!**
- MCAS is activated by input from only one of the airplane's two angle of attack sensors, making the **system susceptible to a single point of failure**.
- **Transport Airplane Risk Assessment Methodology (TARAM)**: "if left uncorrected, the MCAS design flaw in the 737 Max could result in as many as 15 future fatal crashes over the life of the fleet"
- **Boeing was also already well aware, before the first crash, that** if a pilot did not react to unintended MCAS activation within 10 seconds, **the result could be catastrophic**.
- The **grounding cost Boeing \$18.6 billion** in compensation to airlines and victims' families.

Sources: **Wikipedia** <https://en.wikipedia.org> (several pages)
Seattle Times **Archived at:** <https://perma.cc/5KSP-BRZ9> (summary with further links)

Case Study: Lufthansa & Others – Delayed Ticket Refunds

- The flight has long been paid for, but the plane never has because of the pandemic. Nevertheless, **many customers have not received the ticket price refund for months.**
- Lufthansa has received nine billion euros in **government aid**. Aid money has also flown so that the customer money can be repaid!
- If a flight is canceled, the **company must repay the ticket price within seven days** (EU Air Passenger Rights Regulation).
- Apparently, Lufthansa wants to prevent drain of liquidity – **even if it gets more expensive later in court.**
- **Airlines have turned off its automatic reimbursement system.** It was a simple process before Corona – the funds were booked back usually immediately after a flight cancellation.
- The Federal Aviation Office (LBA) can impose **finer** for violations of the passenger rights directive (**up to 30000 € per case**) and even threaten to withdraw the operating license.
- The LBA has initiated administrative offense proceedings against suspicious aviation companies. The proceedings are still ongoing.

Source: **WELT Online** [Archived at: https://perma.cc/HMK8-DVR8](https://perma.cc/HMK8-DVR8)

Case Study: Aviation Industry Lying about Cabin Ventilation in the Corona Pandemic



What?	false statement (lie) of the aviation industry	Short form of the lie (in German)
air in the plane	"as clean as in an operating room" (through HEPA filter)	Operationssaal
air exchange	"COMPLETE in 2 to 3 minutes"	Frischluftquote
air flow in the aircraft cabin	"only from top to bottom" or "no horizontal flows"	Klimavorhang

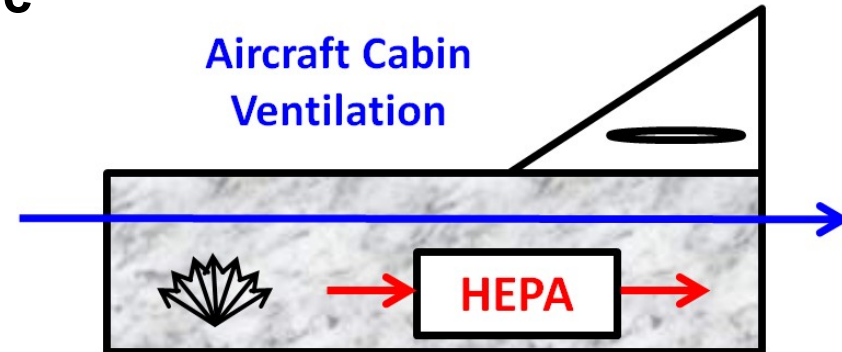
<http://corona.ProfScholz.de>

Case Study: Aviation Industry Lying about Cabin Ventilation in the Corona Pandemic

"Operationsaal" (by HEPA filters)

- S: source strength in kg/s
- Q_e : effective air flow rate for ventilation in m^3/s
- C: concentration of CO2 or any other substance in kg/m^3 in the room

$$S - Q_e C = V \frac{dC}{dt}$$



<https://purl.org/corona/M2020-07-03>
<https://youtu.be/Qro5noC4b5o>

In case of a **steady state** situation (no change in concentration C), the equation simplifies to

$$C = \frac{S}{Q_e}$$

We learn: The concentration is independent of the volume V and depends only on the source strength S and the effective air flow rate Q_e .

With respect to viruses, the effective air flow rate Q_e is the sum of outside air and air through the HEPA filters. A **virus concentration C is present**, if a sick person is on board!

Case Study: Aviation Industry Lying about Cabin Ventilation in the Corona Pandemic

"Frischluftquote" (air exchange COMPLETE in 2 to 3 minutes)

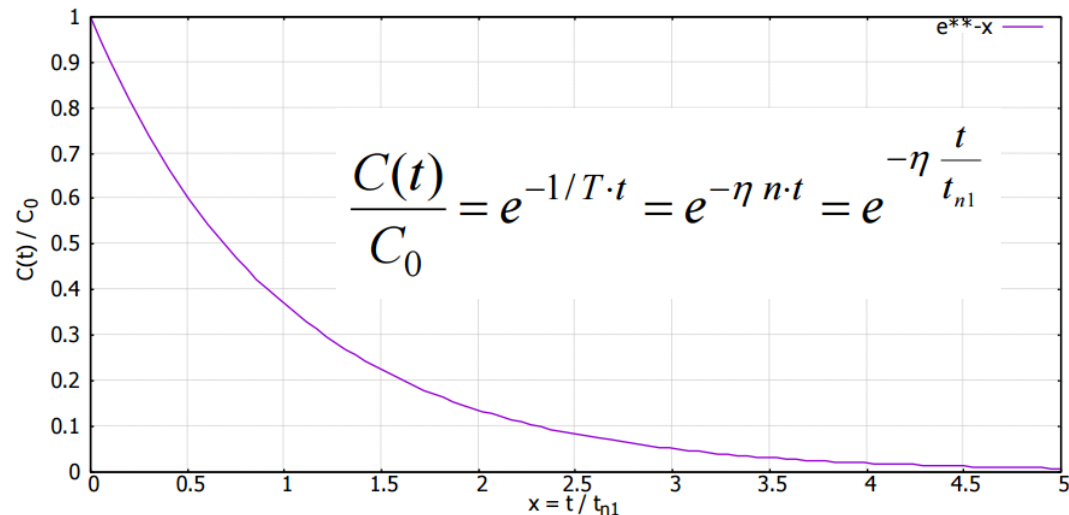


Figure 1: Relative remaining concentration for a ventilation efficiency of $\eta = 1$ versus relative time

Hence, rinsing is an asymptotic process. A relative concentration will only reach the value 0% of the initial amount after an infinitely long time.

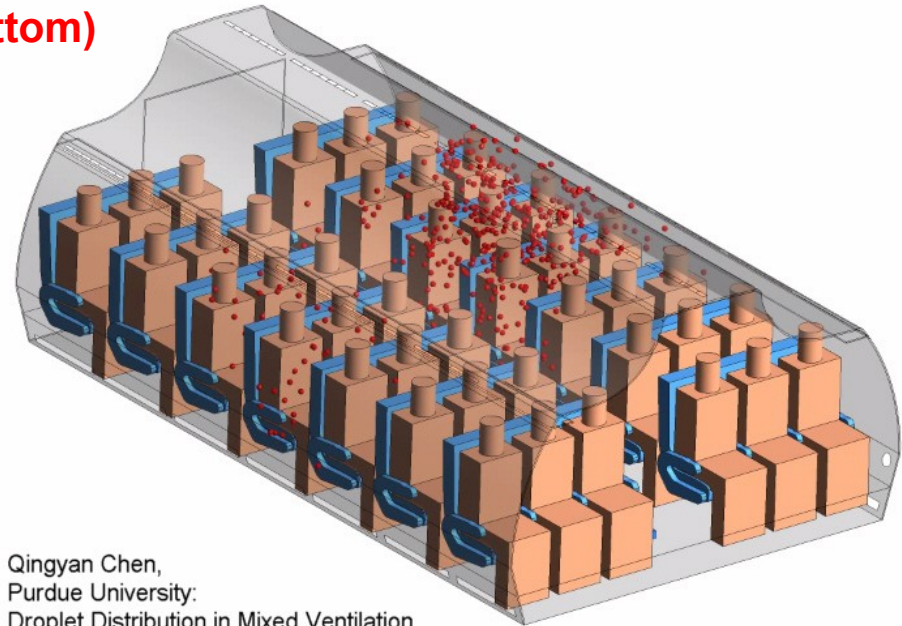
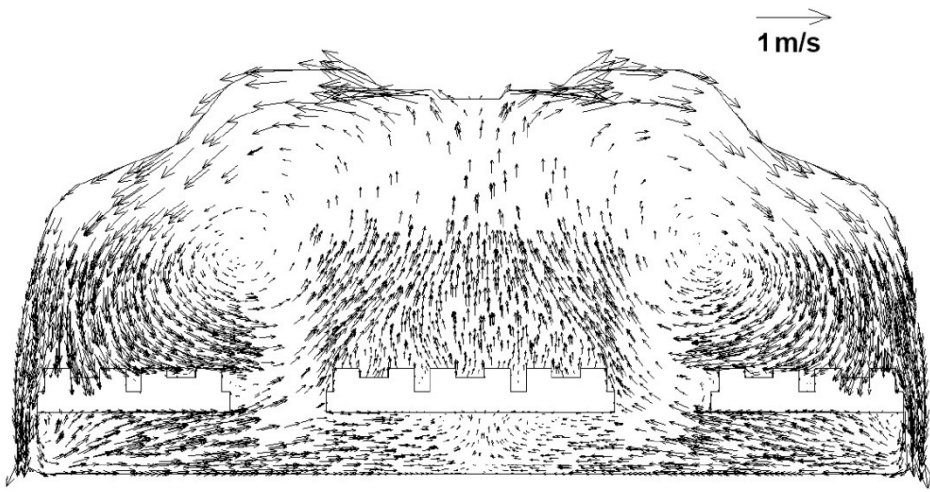
Ventilation with one volume of air (at $x = 1$) reduces the concentration in a perfect mixed ventilation down to **37% of the initial concentration** – never to zero!

SCHOLZ, Dieter: Aircraft Cabin Ventilation Theory, Memo, 2020. – <https://purl.org/AERO/M2020-06-27>

Case Study: Aviation Industry Lying about Cabin Ventilation in the Corona Pandemic

"Klimavorhang" (flow only from top to bottom)

The air conditioning system forms **circulation patterns** of the air and helps to distribute droplets among **several rows** in the aircraft cabin!



Qingyan Chen,
Purdue University:
Droplet Distribution in Mixed Ventilation

Aerosols are further distributed along the **length of the cabin** by turbulence, diffusion, and movement of persons in the cabin!

<https://purl.org/corona/N2020-06-17>

Other Unethical Issues

- 2020: **Lufthansa avoids tax payments in Germany** with subsidiaries based in countries or territories that appear on the EU list of non-cooperative countries and territories for tax purposes. (<https://perma.cc/MJ9P-NDX5>)
- 2020: **Ryanair** busted over **misleading 'low CO2' claims**. (<https://perma.cc/4WLX-YEAF>)
- 2019: **Airbus** under pressure for not doing enough against "**fumes that are making people sick**". (<https://perma.cc/7CC9-BGYZ>)
- 2017: Israel Aerospace Industries, **IAI corruption scandal**. (<https://perma.cc/J7ZK-DEYG>)
- 2017: **United** overbooks. As a consequence it denies boarding or even **drags passengers off the plane**. (<https://perma.cc/TVH9-ULTT>)
- 2017: **Boeing's** aggressive **anti-union campaign**. (<https://perma.cc/7KX9-GCZX>)
- 2015: Relatives accuse **Lufthansa/Germanwings** years after the crash of the Germanwings flight 4U9525 to **avoid sufficient compensation payments**. Compensation – 25000 € per victim and 10000 € each for close relatives because of the victims pain – would be insufficient. (<https://perma.cc/C8ED-JLQ4>, <https://perma.cc/DA7A-LHD7>)
- 2012: **Ryanair ordered to 'review' fuel policy** after making three emergency landings because planes almost ran out of fuel. (<https://perma.cc/S5BL-XW56>)
- 2006: **Boeing** to pay \$615 million to end **Pentagon scandals**. Allegations that Boeing improperly acquired thousands of pages of proprietary documents from rival Lockheed Martin to help it win rocket contracts. (<https://perma.cc/5DMZ-988C>)

This is an excerpt from student 's results about ethical and unethical behavior in aviation.

Summary

$$G^4 = \uparrow \$ \text{☹} †$$

- There is a danger for companies to run into this **negative sequence**: "Continuous **growth** to increase **gain** to satisfy shareholders expectations can lead to **greed** and to an ever more ruthless industry behavior accumulating **guilt** in the end."
- There is a **cascade of obedience** to the law. **The aviation industry is far from abidance by the law** and far from taking up the **code of a respectable businessman**.
- The **list of wrongdoing** in the aviation industry is long:
 - bribery
 - trading lives for profit
 - avoiding payments:
 - tax, compensation, refund,
 - lying about safety critical issues:
 - cabin air quality
 - cabin air ventilation / risk of an infection on board
 - making misleading claims
 - greenwashing

Recommended Reading

The Guardian:

"Boeing's Travails Show What's Wrong With Modern Capitalism"

(<https://perma.cc/2AFL-B5G3>)



"Boeing used its political connections to monopolize the American aerospace industry and corrupt its regulators."

"After the merger [with McDonnell Douglas], the engineers lost power to the financiers."

"Far from being an anomaly, Boeing is the norm in the corporate world across the west."

"Today, high profit margins are a pervasive and corrupting influence across the government and corporate sectors."

"Policymakers have to increase competition for large powerful companies, to bring profits down. Executives should spend their time competing with each other to build quality products, not finding ways of attracting former generals, or administration officials to their board of directors."

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See also:

SCHOLZ, Dieter: Eco-Efficiency in Aviation – Flying Off Course? (German Aerospace Congress 2012, Berlin, 10.-12.09.09.2012), 2012 – Available at: <https://doi.org/10.5281/zenodo.4067014>

SCHOLZ, Dieter: Review of CO2 Reduction Promises and Visions for 2020 in Aviation (German Aerospace Congress 2020, Online, 01.-03.09.2020), 2020. – Available at: <https://doi.org/10.5281/zenodo.4066959>