



Risk Avoiders, Risk Seekers and the Influence of Organizational Culture

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Motivational Factor

- TAM Airbus A-320 PR-MBK
 - July 17, 2007 From SBPA to SBSP
 - 187 casualties

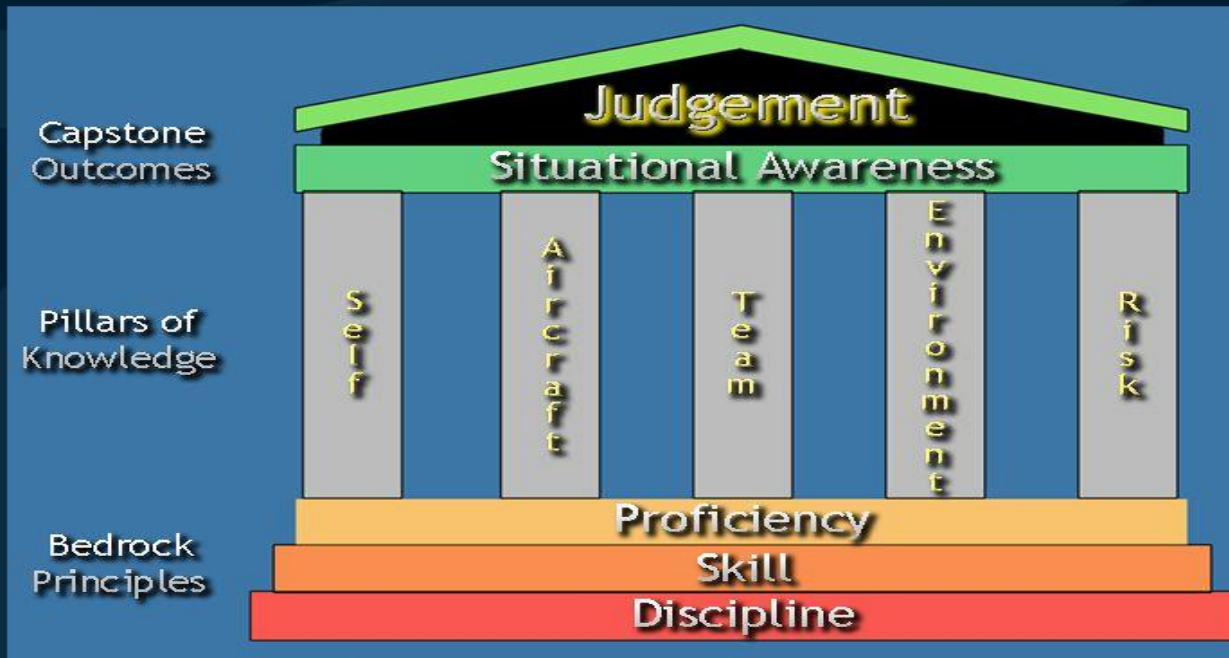


Before we begin...

- As stated by the Final Report to Flight Safety Foundation “Go-around Decision-Making and Execution Project” – 2017, March:
 - “Failure to conduct a go-around is the number one **risk** factor in approach and landing accidents” (Go-around decision-making and execution project - FSF, 2017 March)
 - “Poor professional **judgment**/airmanship (i.e. decision making) as the most frequent casual factor” (FSF, 2017 March)
 - “Management’s **perception of risk** is low” (FSF, 2017 March)



Airmanship



Redefining Airmanship by Anthony Kern

Pilot Education - The Key to Airmanship



Main question that is posed to all of us

- **The risk alignment problem:** Risk as it is perceived by different stakeholders in aviation: *Theory* vs. *Crew perception* vs. *Managers' perception*.

Asymmetrical?



My sole intention...

- Once FSF report (2017, March) stated that “(...) what is lacking, however, is an understanding of the psychology of noncompliance”
- ... My only intention is to present one hypothesis, based on research, theory that would help in the understandings of the psychology of noncompliance from non-stabilized approaches.



FLIGHT PLAN

- The way we think and decide
- The way we perceive the risk
- “Prospect Theory” and the issue of risk taking in human judgment
- Concluding Remarks



The way we think and decide

Bounded rationality...

- Herbert Alexander Simon (1916-2001)
- John Forbes Nash (1928-2015)
- Daniel Kahneman (1934), Gary Klein (1944), Gerd Gigerenzer (1947)



The way we think and decide

- Normatively:
 - Maximum rationality.
 - Unlimited information.
 - Searching for optimisation.
- Positively:
 - The way we really decide.
 - Limited information.
 - Searching for satisfaction.



It is easy to see which kind, most probably, is being used by the managers and which one is being used by the crew, isn't it?



The way we decide “positively” speaking

SYSTEM 1

- *AUTOMATIC (INTUITIVE)*
 - Requires less deliberation time and choosing
 - Requires less calculus. **REQUIRES MORE EXPERIENCE!**
 - Less information (**simple rules**) would be better!

SYSTEM 2

- *CONTROLLED (LOGICAL)*
 - Requires more time for deliberations and choosing
 - Requires more calculus. **REQUIRES LESS EXPERIENCE!**
 - More information (**statistics**) would be better



Examples System 1 / System 2

SYSTEM 1

- Tilly Smith (10 yrs English schoolgirl), Phuket, Thailand, 2004.
- US Airways ditching, Hudson River, 2009.

SYSTEM 2

- Investment decisions.
- Job changing decisions.



The way we (all humans) perceive the risk

From Expected Value (Bernoulli, 1738):

$$V(x) = p_1 \cdot x_1 + p_2 \cdot x_2 + \dots + p_n \cdot x_n$$

To Prospect Theory (Kahneman & Tversky, 1979):

$$V(x) = x^\alpha \text{ if } x > 0$$

$$V(x) = -\lambda(-x^\alpha) \text{ if } x < 0$$

Where $\alpha=0.88$; $\lambda=2.25$



Prospect Theory (Kahneman & Tversky, 1979)

- The posture we take in relation to the risk depends upon our perception about the situation in terms of gains or losses
 - In the terrain of gains we will present an inclination that will favor the risk averse posture. Example of the soccer team.
 - In the terrain of losses we will present an inclination that will favor the risk prone posture. Example of the casino player.



Prospect Theory (Kahneman & Tversky, 1979)

- Although the PT' main findings was taken within controlled experiments (in laboratories), and based in monetary bets, some scientific applications was done with good results:
 - Weyland, K (2000): applying PT for the issues of economic decisions and safety in Latin America.
 - Hastie & Dawes (2001 p.301): exemplifying PT in medical decision making.
 - Hastie & Dawes (2001, p.303): exemplifying PT in social policymakers decisions.
 - Silva, L.M.A. (2010): applying PT with Cadets in decision training lessons at Brazilian Air Force Academy (AFA).
 - Silva, L.M.A. (2013): applying PT in an accident analysis occurred at AFA.



Prospect Theory (Kahneman & Tversky, 1979)

- All aviation industry firmly and decisively prioritizes the safety, but firm operations needs to result in profits also.
- The organizational culture in trade-off among safety and profit may induce crew to see the go-arounds from non-stabilized approaches in terms of gains for safety or losses for profits



Go-around (non-stabilized approach) can be perceived by the crew (Prospect Theory, Kahneman & Tversky, 1979):

As gains (mainly for safety)

- Passengers safety; Company compliance; Company reliability; Standard operation procedures.



Risk Averse Posture:
Decision to “Go-around”

As losses (mainly for profits)

- Passengers time; Company schedules; Fuel consumption; Hosting expenses.



Risk Prone Posture:
Decision to “Land”



Concluding Remarks

- “(...) we should only go-around when the risk associated with an unstable approach is greater than the risk associated with a go-around” (FSF 2017, March: pg.3)
 - It would be possible to think in (i) Loss of Control (LOC), (ii) Controlled Flight Into Terrain (CFIT), (iii) Mid Air Collision (MAC), and (iv) Maximum Weight? And define, during the approach, and before we say “continue”, the risk associated, truly speaking?
 - Without considering pilot’s consciousness that the engines are in iddle after a long-haul flight?
 - Then comes the question: System 1 (Intuitive) or System 2 (Logical)? Simple or Complex Rules/Heuristics to Decide? Should the Crew use Normative or Positive way to Decide?
 - How the resulting conflict can be resolved is not clear.



Concluding Remarks

- Mental Map Design (Damásio, 2018) as the first step to reach a solution for any problem:
 - People really do have preferences. We can't avoid that. We shouldn't avoid this fact!
 - The one and the only one Mental Map that should be shared by all the stakeholders in aviation is the SAFETY DOCTRINE and OPERATIONAL PROCEDURES.
 - Nevertheless being contaminated by any other organizational or air traffic control policies.



Concluding Remarks

- But it is very important that the industry faces the problem collectively, because pilots, as all other humans, are ingrained in a collective culture.
- And collective culture, as stated by Damásio (2018), will always depend on the mental map we form for the problem.
- And aviation stakeholders as a whole should know this. And all of them, Managers, Air Traffic Controllers and Crews (and passengers for certain would agree with this!) shall share one same mental map for this problem, otherwise it won't be instilled in the safety culture.
- The aviation firms should apply all of its best efforts to avoid that some crew see themselves in situation of losses when tackling with decisions to go-around from non-stabilized approaches. Mainly in terms of routes, fuel consumption and hostage expenses.



Concluding Remarks

- In the same way that occurs with RTO, where any pilot, from single engine to jets, knows that a minimum of speed is mandatory to take off;
 - WE NEED TO DISCUSS IF IT WOULD BE POSSIBLE TO FIND OUT ONE SINGLE AND SIMPLE RULE to be used in decisions concerning G.A./not G.A. From this simple rule will emerge one culture of practice. Maybe we may say that V1 has become as intuitive for pilots at all levels, as “nose up/nose down” is for any pilot, to gain or to lose speed.



Concluding Remarks

- In the same manner that was supposed that one pilot memorizes the acronym “5 Ups” to G.A: Power Up, Nose Up, Gear Up, Flaps Up, Speak Up.
- We need to develop a *Simple Rule to G.A. Decision Making*, that considers also LOC, CFIT, MAC.
- We have to find out how to conjugate system 1 and system 2
 - Maybe in the same way that is done in sports and in music.



Concluding Remarks

- One example of Simple Rule in Landings





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Thank you very much!

- I have been working hard to support my research field and my community of practice to find out some heuristics that could help us to keep on evolving. But we must remember that the most important decisions we take are based on a very sophisticated algorithm called sensations, emotions and desires.

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