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Asking the Wrong Questions Leads to Creating the Wrong Solutions:

Why Heuristics Are Critical in Reconciling the 'Bias vs. Error' Debate in the Governance of Major Projects?

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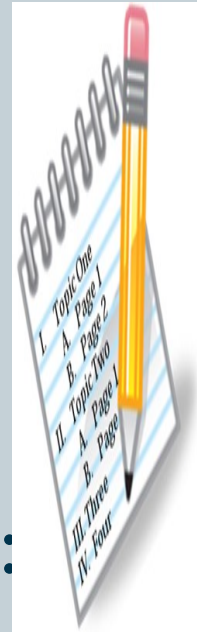
Outline

- **Part II** - The error school and the Pollyannas:

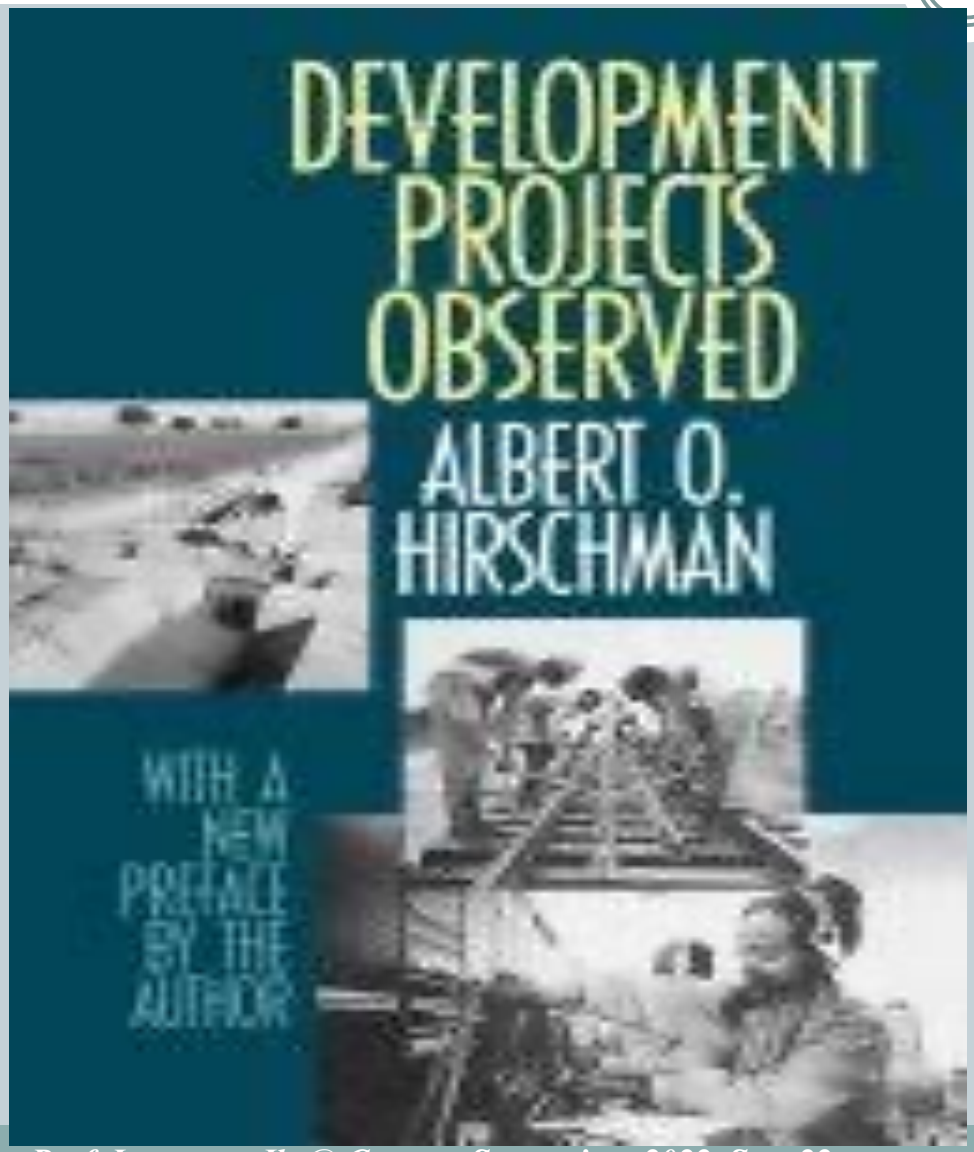
  It's all about error!
- **Part III** - The bias school and the Cassandras:

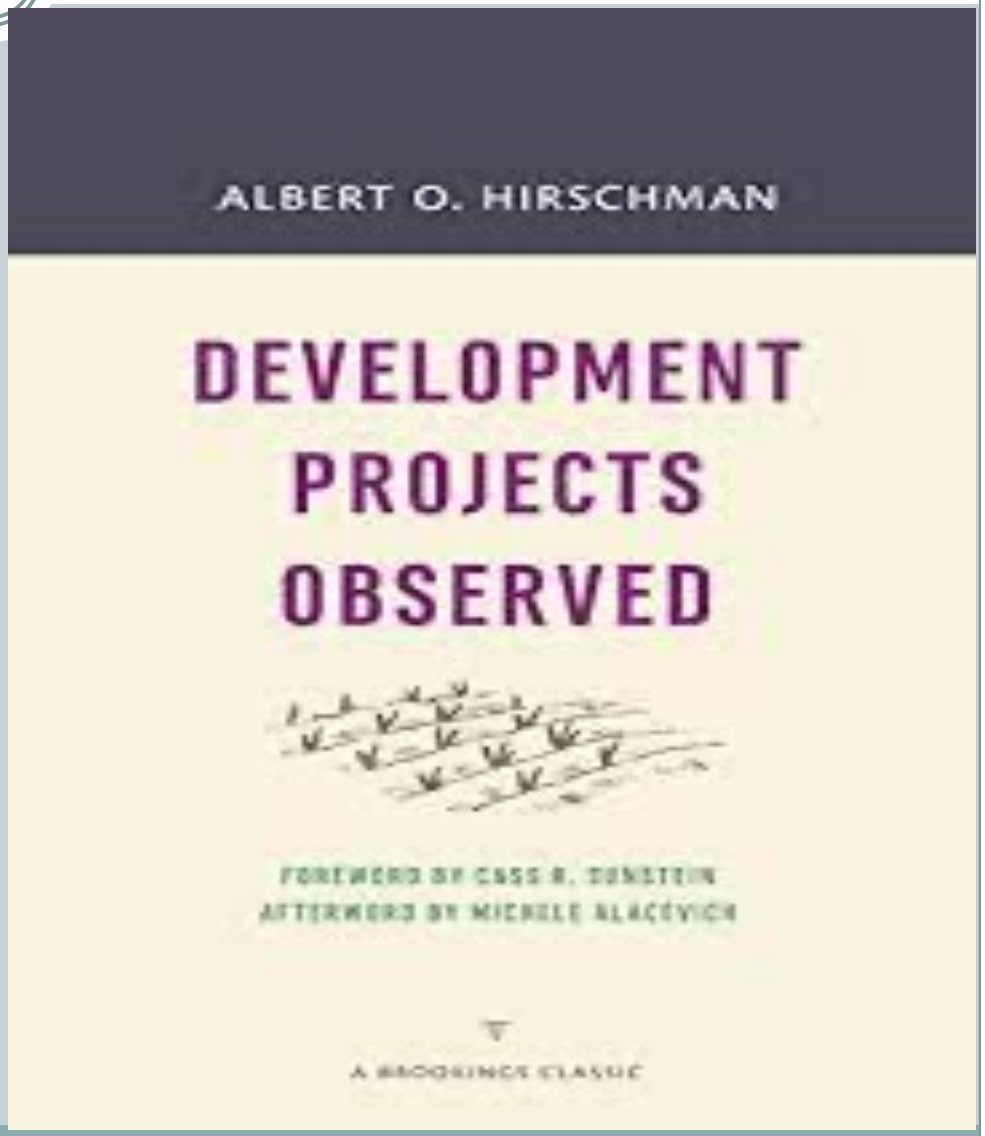
  It's all about bias!
- **Part IV** – Putting the two schools back to back:

  Calling heuristics to the rescue and reconciling beneficial and detrimental heuristics



Pollyanna-in-chief?
it's all about *creative* error; e.g., ignorance can be good for projects!





Cassandras:
it's all about *detrimental* bias; e.g., ignorance is bad for projects!

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The Fallacy of Beneficial Ignorance: A Test of Hirschman's Hiding Hand

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Summary. — Albert O. Hirschman's principle of the Hiding Hand stands stronger and more celebrated today than ever. The principle states that ignorance is good in planning, because if decision makers knew the real costs and difficulties of projects, few ventures would ever get started. The paper presents the first systematic test of the principle of the Hiding Hand, including a test of whether Hirschman's theory may be replicated with more and better data. This was found not to be the case. First, statistical tests reject the principle of the Hiding Hand at an overwhelmingly high level of significance ($p < 0.0001$). In reality, the exact opposite happens of what the principle states: instead of project success being secured by "creative error" and "beneficial ignorance"—where higher-than-estimated costs are outweighed by even higher-than-estimated benefits—the average project is in fact undermined by a double whammy of substantial cost overruns compounded by substantial benefit shortfalls. Second, Hirschman was found to have made the error of sampling on the dependent variable, undermining the validity of his findings. Third, Hirschman's sample of projects, on which he built his principle, is too small to support his wide conclusions. Fourth, Hirschman misrepresented his findings and misled his readers. In sum, the data do not support Hirschman's proposition that ignorance is good in planning. Ignorance is bad, if by bad we mean that ignorance leads to starting projects that should not have been started. Finally, the data also do not support an interpretation of Hirschman as an early behavioral economist, as proposed by Sunstein. Hirschman was a victim, not a student, of bias.

Keywords — Albert O. Hirschman, The principle of the Hiding Hand, Ignorance, Behavioral economics, Management, Development

1. WHY THE HIDING HAND IS IMPORTANT

Recently, when San Francisco's new Transbay Terminal megaproject—a multi-billion-dollar transit and real estate development scheme—incurred hundreds of millions of dollars in cost overruns, Willie Brown, former California State Assembly Speaker and Mayor of San Francisco, tried to calm the public with these words in *The San Francisco Chronicle*:

> "News that the Transbay Terminal is something like $300 million over budget should not come as a shock to anyone. We always knew the initial estimate was way under the real cost. Just like we never had a real cost for the [San Francisco] Central Subway or the [San Francisco–Oakland] Bay Bridge or any other massive construction project. So get off it. In the world of civic projects, the first budget is really just a down payment. If people knew the real cost from the start, nothing would ever be approved. The idea is to get going. Start digging".
> [Brown, 2013]

Willie Brown here expresses the essence of Albert O. Hirschman's principle of the Hiding Hand:

Brookings Classic (Hirschman, 2015) and celebrated by people like Cass Sunstein, Harvard Professor and administrator in the Obama White House, and Malcolm Gladwell, best-selling author and staff writer at *The New Yorker* (Gladwell, 2013; Sunstein, 2015a). The impact of the principle in the academy, policy, and practice is undisputed. And as more and bigger projects are built around the world in what has been dubbed the "biggest investment boom in history," the principle is becoming increasingly consequential in justifying rapidly growing project portfolios (Flyvbjerg, 2014a).[2] Below it will be argued, however, that the principle of the Hiding Hand is popular because it is politically convenient, and not because it is valid as an explanation of human behavior. We will see that instead of Hirschman's benevolent Hiding Hand, a malevolent Hiding Hand is typically at play. Hirschman's principle is popular because it gives theoretical justification to the "start digging" argument of the Willie Browns of the world. It perfectly fits the "propensity for action" found with project promoters and developers, a fact Hirschman (1967a, p. 21) was well aware of. Hirschman was that rare type of scholar who is as interested

Pollyannas:
It's all about error; e.g., ignorance can be good for projects !

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Beneficial or Detrimental Ignorance: The Straw Man Fallacy of Flyvbjerg's Test of Hirschman's Hiding Hand

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SUMMARY

In a recent paper in this journal, "*The Fallacy of Beneficial Ignorance: A Test of Hirschman's Hiding Hand*", Professor Bent Flyvbjerg claims that there is no such thing as beneficial ignorance and that ignorance is detrimental to project success. Moreover, he argues that if Hirschman's principle of the Hiding Hand were correct, then benefit overruns would exceed cost overruns. Thus, with a statistical test, he demonstrates that the Hiding Hand is in fact less common than its "evil twin", the Planning Fallacy. In this rejoinder, the author shows that Flyvbjerg's test is built on a straw man fallacy and that he fails to refute the Hiding Hand. Contrary to Flyvbjerg—who focuses on the narrow costs and benefits—this paper provides evidence that while the Hiding Hand is found among projects that are project *management* failures but *project* successes, the Planning Fallacy fits with projects that are both project *management* and *project* failures. On that basis, the author analyzes a sample of 161 World Bank-funded projects of different types and finds that the Hiding Hand prevails. While future research should ascertain this finding, the author then points out the methodological limitations of Flyvbjerg's test. Indeed, it is ironic that the Hiding Hand, a principle crafted against the very idea of cost–benefit analysis, is refuted on that very basis. Even worse, Flyvbjerg, in his cost–benefit analysis, ignores the full life-cycle project costs and benefits, the unintended project effects, the difficulties, and problem-solving abilities so dear to Hirschman, and, thus, treats the management of projects as a kind of "black box". Finally, the author submits that Hirschman was a behavioral project theorist, and argues that it is more important to shed light on the circumstances where the Hiding Hand works than to question whether the principle of the Hiding Hand is right.

The tyranny of OR and the power of AND:
Both error and bias prevail! E.g., ignorance can be both good and bad

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Moving Beyond the Planning Fallacy: The Emergence of a New Principle of Project Behavior

Lavagnon A. Ika, Peter E. D. Love, and Jeffrey K. Pinto

Abstract—**The question—what explains cost overruns and benefit shortfalls—remains an important conversation in project management. Two theoretical principles, the Planning Fallacy and the Hiding Hand, shed light on project behavior, that is how projects take different and complex out-turns. The Planning Fallacy denotes the tendency for forecasts of project schedules, costs, and benefits to be unrealistically close to best-case scenarios. The Hiding Hand, however, suggests that it is not always bad to overrate benefits and underrate costs and difficulties of the proposed projects as creativity may help succeed in unforeseen ways. This article focuses on the Planning Fallacy *versus* Hiding Hand or the Planning Fallacy debate. The bone of contention is whether the Planning Fallacy trumps the Hiding Hand and thus best explains project behavior and performance. We unravel the ontological, epistemological, theoretical, and methodological assumptions behind the debate. Then, considering these contrasting assumptions and the uncertainties and complexities that surround large-scale projects, we *complexify* the debate in line with the tradition of complexity thinking. In the face of the either/or framing that prevails, we propose a balanced theoretical approach that would accommodate both the Planning Fallacy and the Hiding Hand explanations of project behavior, to understand why projects experience cost overruns and benefit shortfalls. In so doing, we lay the foundations for the emergence of a new project behavior principle—*The Fifth Hand*. We conclude with a research agenda that highlights the key methodological challenges that need to be addressed to determine the presence of the Fifth Hand.**

Index Terms—**Benefit shortfalls, complexity, cost overruns, hiding hand, planning fallacy, project behavior.**

I. Introduction

PROJECT-BASED-WORK is at flood tide as projects are being undertaken to levels previously unseen. Thus, there is a concomitant increase in scholarship. This is a testament to the sheer number of scholars from a variety of disciplines actively engaging and undertaking project management research from varying perspectives. Project management scholarship is, in essence, a conversation [33] often with "neighboring" fields of inquiry such as construction, strategy, organizational behavior, human resources management, operations management, information systems, and innovation management [9], [26], [42], [45], [53].

Though enriching, this conversation with other fields of research may be challenging in light of the diversity of theories for the studies in, on, and around projects [17], [22]. Accordingly, there prevails a tendency for scholars to borrow hand-me-down theories from other disciplines [42], which, we contend, may not be able to *fully* deal with the uncertainties and complexities associated with getting the right projects right, particularly when they are of a large and/or complex nature [6], [9], [34], [36], [43], [45], [62]. Indeed, the shoehorning of these imported theories to project settings may create a false currency or prompt a debate based on misguided or misinterpreted assumptions. The upshot in this instance can be confusion, which can adversely impact decision-making and jeopardize the performance and practice of projects [57], [76].

Perhaps, the topic of conversation where the aforementioned challenges are acute concerns what explains cost overruns and benefit shortfalls. Prospect theory, for example, developed by the Nobel Laureate Daniel Kahneman with Amos Tversky [38], [71] is drawn upon by Flyvbjerg [15] to explain project performance using the Planning Fallacy principle. Under the banner of prospect theory, the Planning Fallacy emerges as a phenomenon whereby planners and managers display optimism bias during the framing and valuation phases of projects. The upshot is the tendency for forecasts of project times, costs, and benefits to be close to best-case scenarios [46]. This has been the case for a wide variety of projects such as the 2004 Greece Olympics, the Airbus A380 passenger aircraft [15], the Ciudad Real Airport in Spain and the Canadian Firearms Program [34], which all incurred cost overruns and benefit shortfalls. Consequently, planners and managers create a fertile environment in which projects—due to irrational or overoptimistic choices or unintentional or deliberate actions they take *a priori*—are bound to underperform.

Notwithstanding the contribution of the Planning Fallacy [15], the everlasting puzzle in project management research—what explains cost overruns and benefit shortfalls—remains a scholarly conversation "that has been stuck for more than 20 years" [27, p. 717]. Hence, the focus of this article is on the more recent yet enlightening debate over the significance of the Planning Fallacy [15], [16] [34], [49], [50], [51]. Remarkably, a

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The tyranny of OR and the power of AND:
Both error and bias can prevail; e.g., ignorance can be both good and bad

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Bias versus error: why projects fall short

Lavagnon Ika, Jeffrey K. Pinto, Peter E.D. Love and Gilles Pache

Introduction

Major infrastructure projects are on a roll. This trend is not likely to change in the postpandemic world as governments aim to stimulate employment, revitalize their economies and address climate change. For example, the Belt and Road Initiative or "One Belt, One Road" mega-project, led by China, which seeks to build new silk roads, is worth more than US$1,000bn. However, as pharaonic as they may be, major projects often make the headlines for less positive reasons, often due to a fourfold "whammy" of considerable delays at their completion, staggering cost blowouts, dismal benefit shortfalls and painful stakeholder disappointments. Cases in point include the Sydney Light Rail (Australia), the Phoenix Pay System (Canada), the Berlin-Brandenburg Airport (Germany), the Delhi Airport Metro Express (India) and the Honolulu Rail Transit Project (USA).

Thus, project managers and funders face an uphill challenge: they have a hard time getting their major projects right. Project managers are confronted with the difficulty of delivering their projects within budget, on time and in accordance with their original scope. This problem refers to the "Iron Law of Major Projects," a class of projects that is: "over budget, over and over again" (Flyvbjerg, 2017). Moreover, this short-term delivery underperformance in major projects is in many cases compounded as project funders have difficulties meeting benefit and/or stakeholder expectations (Ika *et al.*, 2022).

Yet the question of what explains project underperformance and what can be done about it remains a longstanding puzzle fraught with academic, practitioner and even legal controversies. Two overarching schools of thought prevail but have opposing views on why projects experience drift (Love *et al.*, 2022). The "error school" associates project drift with the utilization of imperfect management techniques, making honest mistakes not only during forecasting but also during the execution process (e.g. judgment and decision-making), inexperience, lack of knowledge and having incomplete data (e.g. knowledge and rule-based errors when confronted with complex and uncertain situations). Contrastingly, the "bias school," which dominates contemporary thinking and practice, links project drift to a systematic distortion of logical thinking or deviation between the (average) judgment of a person or a group and a true value or norm (e.g. a statistical principle), whether intentional or not, leading to misjudgments and inappropriate decision-making (Ika *et al.*, 2022).

So, which of the two rival schools of thought best explains the underperformance of major projects? At a time when the economic response to the pandemic in countries like Australia, China and the USA involves significant investment in major infrastructure projects, this question matters more than ever for policymakers to ensure that value for money is achieved. What is more, the Conference of the Parties 2021 conference attended by countries that signed the United Nations Framework on Climate Change has advocated greater investment in infrastructure to support the use of renewable technologies to address environmental sustainability. While confusion regarding the causes of project underperformance is high, there is a concomitant universal push for greater and greater emphasis on projects and infrastructural development.

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Do you recognize this project: Was error at play (e.g., was ignorance good for it)?

It's all about creative error; e.g. ignorance can be good: The Hiding Hand Principle (Hirschman, 1915-2012)

Bad news:

- We tend to be over-optimistic
- We overestimate project benefits and the likelihood of project success
- We underestimate project costs and risks

Good news:

- We also underestimate our own creativity and ability to overcome problems
- Thus, the Hiding Hand 'beneficially hides difficulties from us' **through 'creative error'** and makes us 'stumble into achievement'.

Source: Hirschman, 1967

Can the Hiding Hand or error shed light on project behavior/performance?

Here is what the Premier Joe Cahill had to say about the Sidney Opera:

- 'I want you to go down to Bennelong Point and make such progress that no one who succeeds me can stop this going from completion'

Here is what Willie Brown, the Mayor, had to say in 2013 about the San Francisco Transbay Transit Center

- 'If people knew the real cost from the start, nothing would ever be approved. The idea is to get going. Start digging'

So, the Hiding Hand is all about error! (Read Love, Ika et al.)

Bad news:

- We tend to be over-optimistic
- We overestimate project benefits and the likelihood of project success
- We underestimate project costs and risks

But why?

- Because of error: scope changes, complexity, and uncertainty

What is error anyway?

- Error refers to the use of imperfect techniques, making honest forecasting mistakes, lacking experience, and having inadequate data (Flyvbjerg et al., 2002; Ika et al., 2021)

Do you recognize this project: Was bias at play or was ignorance bad for it?

It's all about detrimental bias; e.g., ignorance is bad: The Planning Fallacy Principle (Kahneman, 2011 ;Flyvbjerg, 2016)

Bad news:

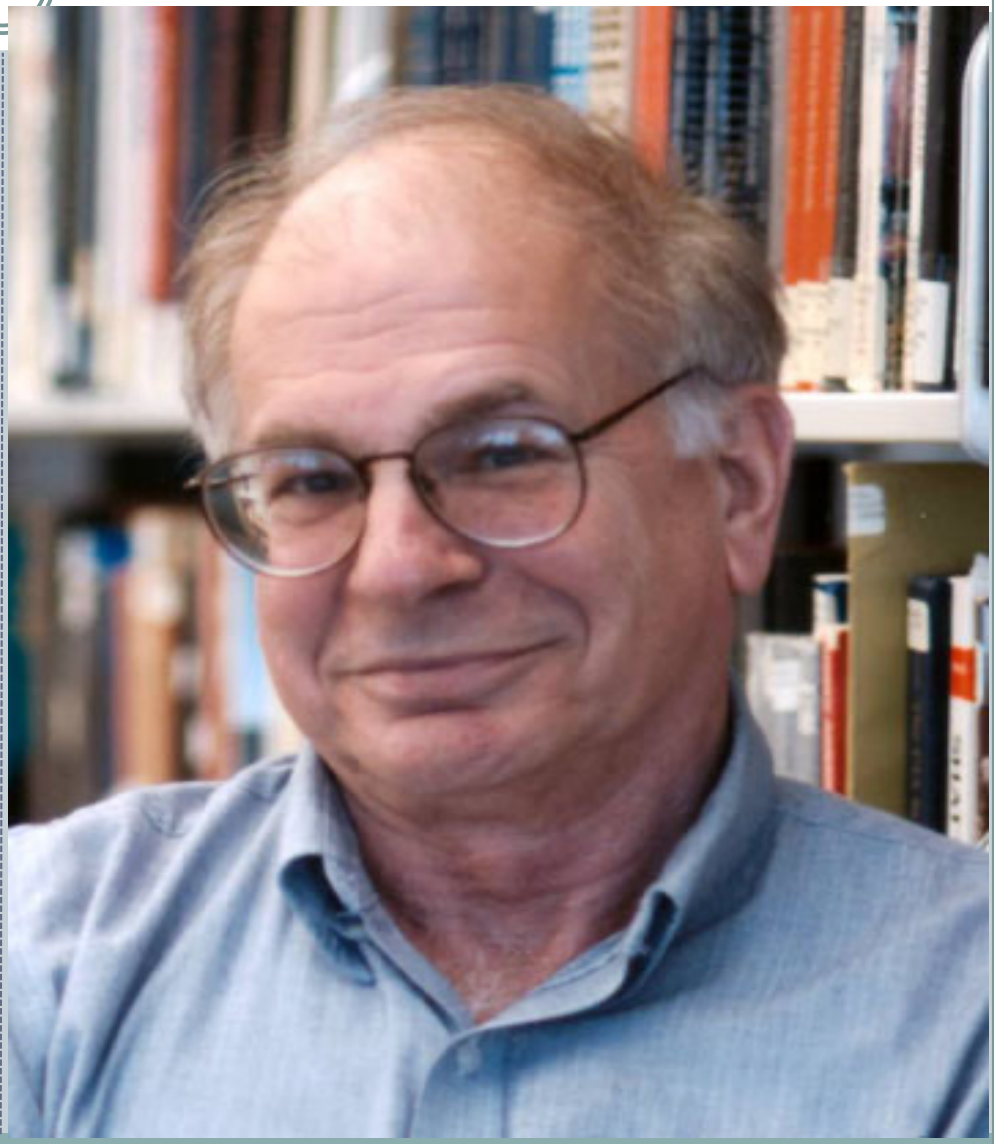
- We tend to be over-optimistic
- We overestimate project benefits and the likelihood of project success
- We underestimate project costs and risks

And…bad news as well:

- We also overestimate our own creativity and ability to overcome project problems

- The typical project experiences a double whammy of cost overruns and benefit shortfalls!

Sources: Kahneman, 2011 and Flyvbjerg, 2016



Can the Planning Fallacy or bias shed light on project behavior/performance?

Take the Don Quixote Airport and the report on its dismal bankruptcy:

- 'The loans taken out were enough to cover the construction phase but no thought was given to the investment needed to make the airport function as a business'

- 'The time for the airport will come! It is not a 'get-rich-quick scheme'

- Predictable but avoidable fiasco
- Each province wants an airport just as they all want a university
- Only reason to host the airport: City of Don Quixote; only 75 000 citizens
- Unrealistic traffic estimates

José Maria Barreda, Premier La Castilla la Mancha, Spain

So, the Planning Fallacy is all about bias! (Flyvbjerg et al.)

Bad news:

- We tend to be over-optimistic
- We overestimate project benefits and the likelihood of project success
- We underestimate project costs and risks

But why?

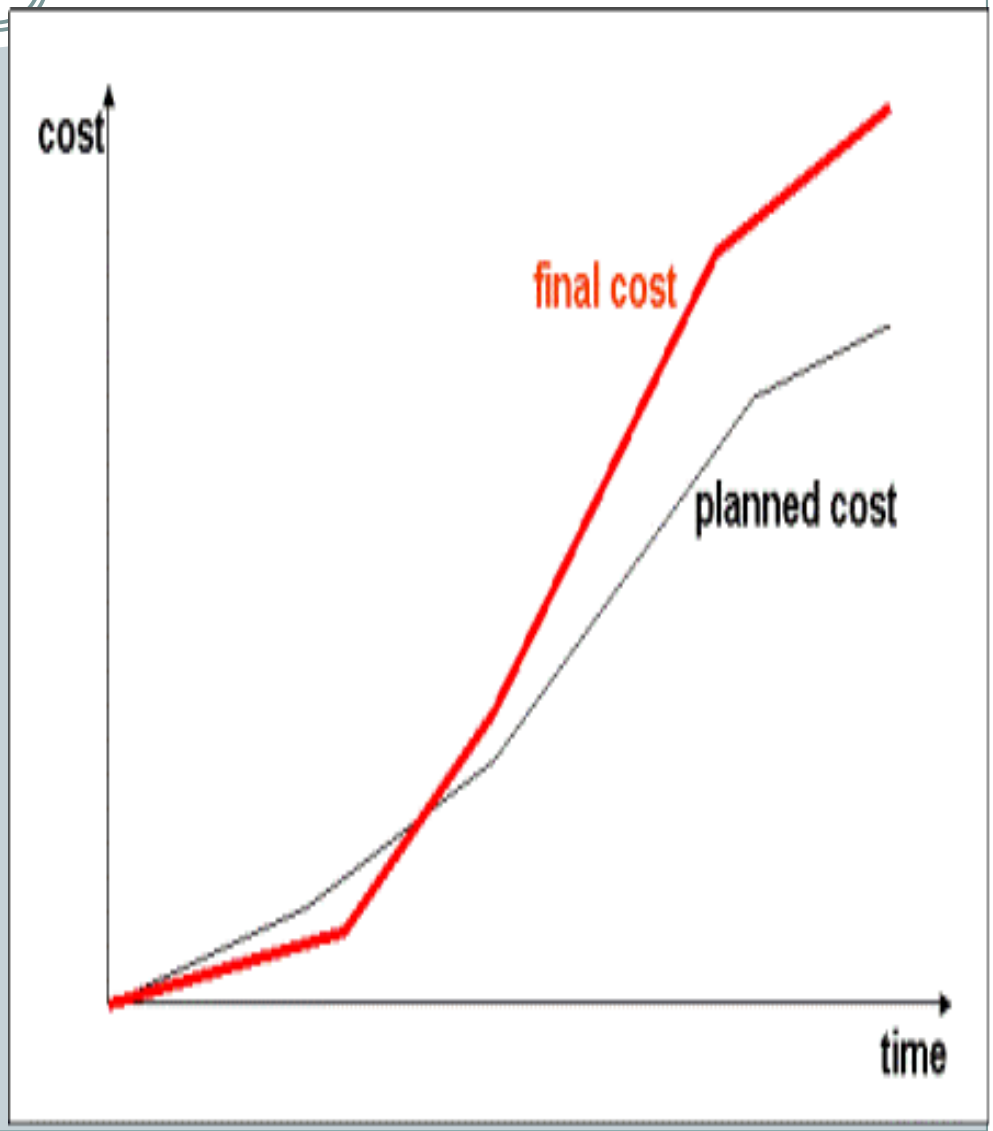
- The problem is not cost overrun, but underestimation
- Because of behavioral bias in the main: the Planning Fallacy
- Optimism bias (delusion) and strategic misrepresentation (deception)

What is bias anyway?

- Bias is a systematic deviation between the (average) judgment of a person or a group and a true value or norm, or in most cases a deviation from a statiscal principle (Gigerenzer, 2013; Ika et al., 2021)

Bias versus error: What's the evidence or how many projects experience cost deviations?

- Unintentional vs. intentional PF
- 80% to 90%; Iron Law (Flyvbjerg, 2016; Flyvbjerg et al., 2002)
- At best 57% (Love, Ika et al., 2019, 2021)
- At best 60% prone to optimism bias (Ika & Feeny, 2022)
- Optimism bias reduces the chances of project performance by 20% max. (Ika & Feeny, 2022)

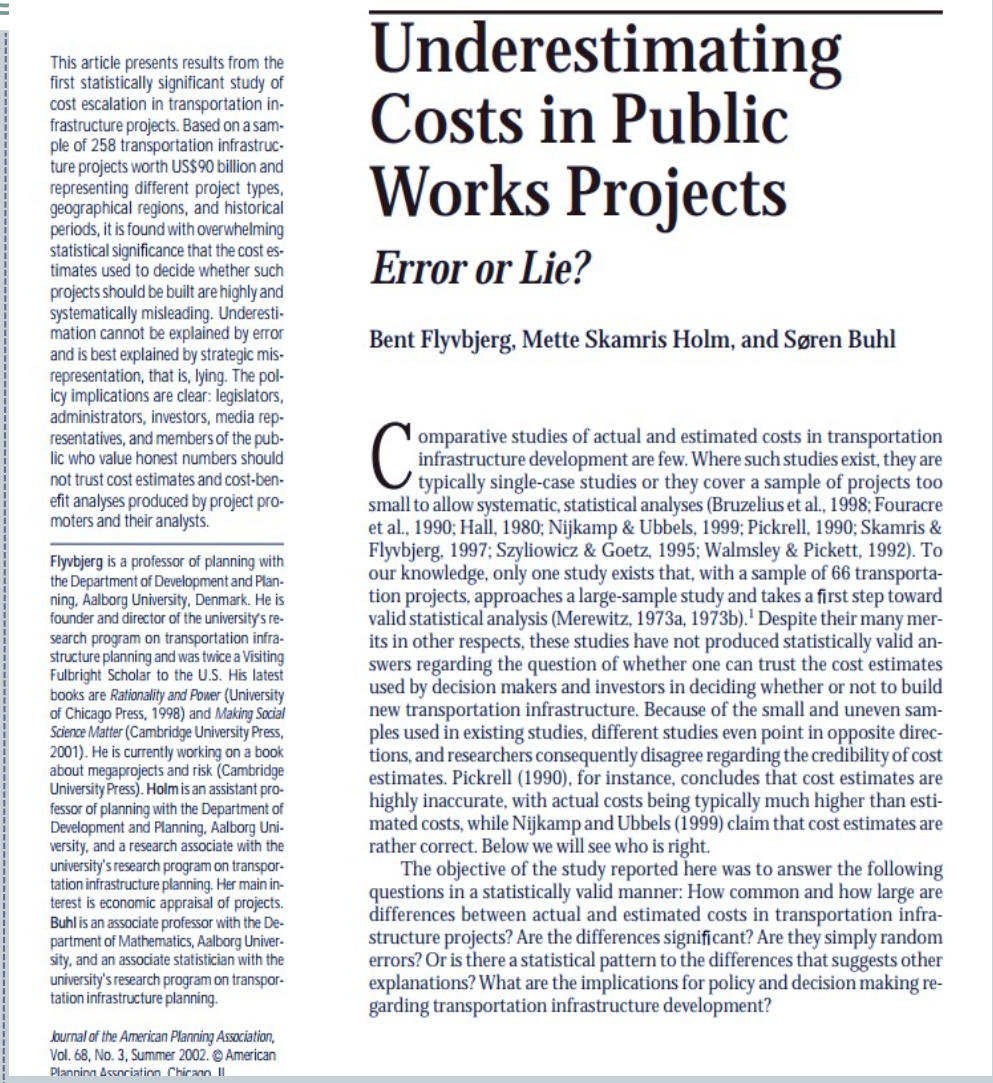


Optimism bias in transportation projects

Cost overruns of 258 large scale transportation projects (roads, bridges, rails)

- 9 out of 10 projects have cost overrun
- 20% for rails, 34% for bridges; 20% for roads
- Overrun is found in 20 nations and 5 continents
- Overrun is constant for the 70-year period covered by study

Source: Flyvbjerg et al. (2002)



This article presents results from the first statistically significant study of cost escalation in transportation infrastructure projects. Based on a sample of 258 transportation infrastructure projects worth US$90 billion and representing different project types, geographical regions, and historical periods, it is found with overwhelming statistical significance that the cost estimates used to decide whether such projects should be built are highly and systematically misleading. Underestimation cannot be explained by error and is best explained by strategic misrepresentation, that is, lying. The policy implications are clear: legislators, administrators, investors, media representatives, and members of the public who value honest numbers should not trust cost estimates and cost-benefit analyses produced by project promoters and their analysts.

Flyvbjerg is a professor of planning with the Department of Development and Planning, Aalborg University, Denmark. He is founder and director of the university's research program on transportation infrastructure planning and was twice a Visiting Fulbright Scholar to the U.S. His latest books are *Rationality and Power* (University of Chicago Press, 1998) and *Making Social Science Matter* (Cambridge University Press, 2001). He is currently working on a book about megaprojects and risk (Cambridge University Press). **Holm** is an assistant professor of planning with the Department of Development and Planning, Aalborg University, and a research associate with the university's research program on transportation infrastructure planning. Her main interest is economic appraisal of projects. **Buhl** is an associate professor with the Department of Mathematics, Aalborg University, and an associate statistician with the university's research program on transportation infrastructure planning.

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Underestimating Costs in Public Works Projects

Error or Lie?

Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl

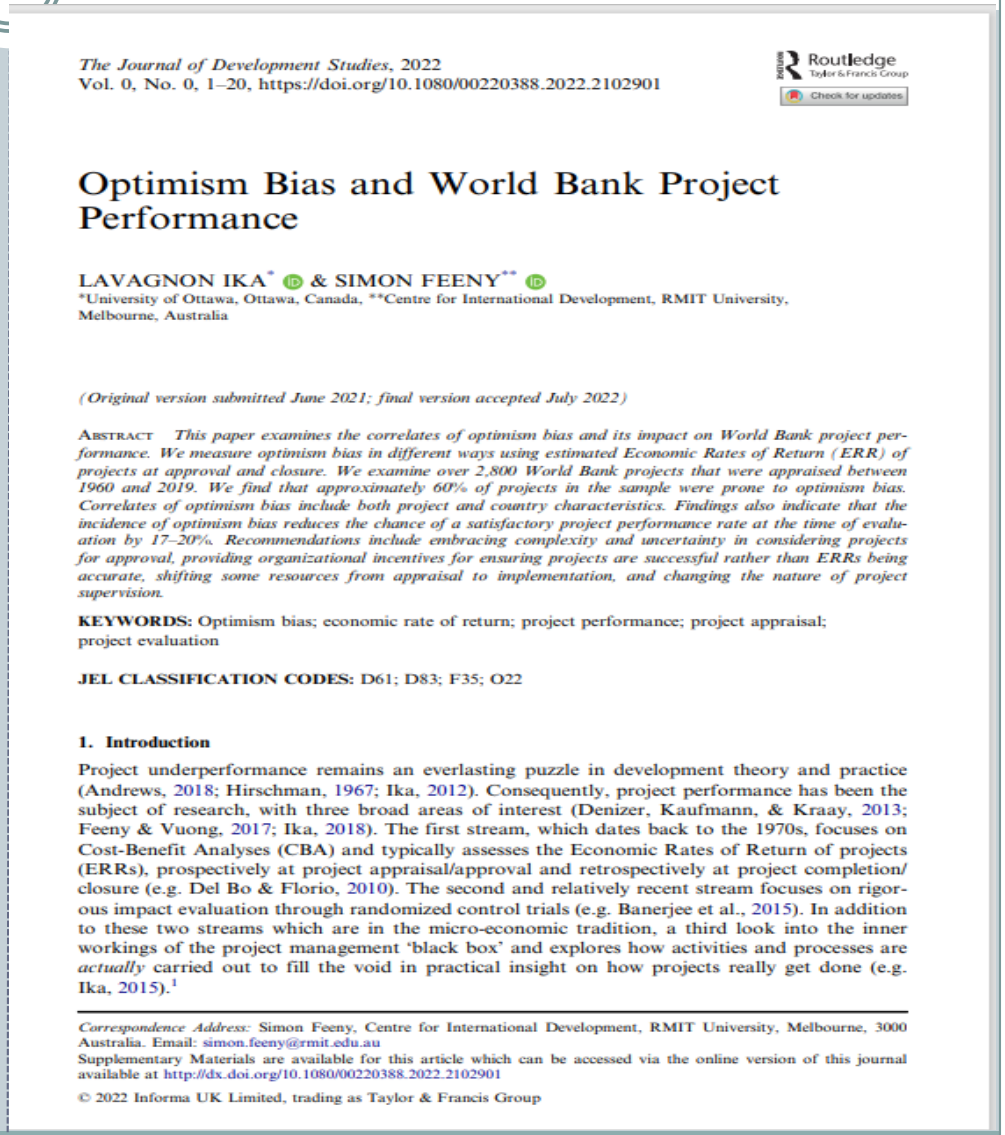
Comparative studies of actual and estimated costs in transportation infrastructure development are few. Where such studies exist, they are typically single-case studies or they cover a sample of projects too small to allow systematic, statistical analyses (Bruzelius et al., 1998; Fouracre et al., 1990; Hall, 1980; Nijkamp & Ubbels, 1999; Pickrell, 1990; Skamris & Flyvbjerg, 1997; Szyliowicz & Goetz, 1995; Walmsley & Pickett, 1992). To our knowledge, only one study exists that, with a sample of 66 transportation projects, approaches a large-sample study and takes a first step toward valid statistical analysis (Merewitz, 1973a, 1973b).[1] Despite their many merits in other respects, these studies have not produced statistically valid answers regarding the question of whether one can trust the cost estimates used by decision makers and investors in deciding whether or not to build new transportation infrastructure. Because of the small and uneven samples used in existing studies, different studies even point in opposite directions, and researchers consequently disagree regarding the credibility of cost estimates. Pickrell (1990), for instance, concludes that cost estimates are highly inaccurate, with actual costs being typically much higher than estimated costs, while Nijkamp and Ubbels (1999) claim that cost estimates are rather correct. Below we will see who is right.

The objective of the study reported here was to answer the following questions in a statistically valid manner: How common and how large are differences between actual and estimated costs in transportation infrastructure projects? Are the differences significant? Are they simply random errors? Or is there a statistical pattern to the differences that suggests other explanations? What are the implications for policy and decision making regarding transportation infrastructure development?

Optimism bias and World Bank project performance

- Project types: infra; gov.; health, education, etc.
- Over 2,800 projects appraised between 1960 and 2019
- About 60% of projects are prone to optimism bias
- Optimism bias reduces odds of success by 17-20% max

Economic Rate or Return (ERR)	N	%
Project ERR higher at closure than approval (pessimism bias)	1,007	35.3
Project ERR lower at closure than approval (optimism bias)	1,723	60.4
Project ERR the same at closure as approval	123	4.3
Total	2,853	100.0



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Optimism Bias and World Bank Project Performance

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(Original version submitted June 2021; final version accepted July 2022)

ABSTRACT *This paper examines the correlates of optimism bias and its impact on World Bank project performance. We measure optimism bias in different ways using estimated Economic Rates of Return (ERR) of projects at approval and closure. We examine over 2,800 World Bank projects that were appraised between 1960 and 2019. We find that approximately 60% of projects in the sample were prone to optimism bias. Correlates of optimism bias include both project and country characteristics. Findings also indicate that the incidence of optimism bias reduces the chance of a satisfactory project performance rate at the time of evaluation by 17–20%. Recommendations include embracing complexity and uncertainty in considering projects for approval, providing organizational incentives for ensuring projects are successful rather than ERRs being accurate, shifting some resources from appraisal to implementation, and changing the nature of project supervision.*

KEYWORDS: Optimism bias; economic rate of return; project performance; project appraisal; project evaluation

JEL CLASSIFICATION CODES: D61; D83; F35; O22

1. Introduction

Project underperformance remains an everlasting puzzle in development theory and practice (Andrews, 2018; Hirschman, 1967; Ika, 2012). Consequently, project performance has been the subject of research, with three broad areas of interest (Denizer, Kaufmann, & Kraay, 2013; Feeny & Vuong, 2017; Ika, 2018). The first stream, which dates back to the 1970s, focuses on Cost-Benefit Analyses (CBA) and typically assesses the Economic Rates of Return of projects (ERRs), prospectively at project appraisal/approval and retrospectively at project completion/closure (e.g. Del Bo & Florio, 2010). The second and relatively recent stream focuses on rigorous impact evaluation through randomized control trials (e.g. Banerjee et al., 2015). In addition to these two streams which are in the micro-economic tradition, a third look into the inner workings of the project management 'black box' and explores how activities and processes are *actually* carried out to fill the void in practical insight on how projects really get done (e.g. Ika, 2015).[1]

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Bias versus error: Underlying views

	Paradigms or schools (Love et al., 2021)	
Key Concepts	Project Management or error school (Best-practices)	Governance or bias school (Decision-makers accountability)
Ontology	A project is fundamentally a process of pursuit, experimentation and discovery. It's all about complexities. Project success and failure are inextricably linked	A project is fundamentally a deliberate leap into a planned future. It's all about the plan. Success and failure are black and white
Theory (Exemplar)	**Hirschman's Hiding Hand**	**Kahneman's Planning Fallacy**
Epistemology (Exemplar)	Learning is all (possibilism): Being ready to veer from the plan when confronted with a complex situation and learn from experience; a focus on 'what is'	Knowing is all (positivism): Bring the project back to plan and back on track in the face of deviations; a focus on what 'must be'.
Definition of cost mis-performance	The extent of monetary deviation from the price agreed with a contractor/consortium and the settlement of the final account (i.e., final contract sum)	Actual cost minus estimate cost with cost measured in the local currency at constant prices and against a consistent base-line in absolute or relative terms
Baseline measurement	Contract award (i.e., determination of price)	The budget estimate at the decision to build
Causes of cost mis-performance	Pathogens (i.e., strategic risks), planning and execution errors, scope changes, human (behavioural) bias, complexity and uncertainty	Behavioural bias and strategic misrepresentation
Goal	To understand whether a project management system works	To understand whether decision-makers make well-informed decisions

Does bias outweigh error?

Does bias outweigh error?

Is cost deviation all about bias or error and what do do about it?

Recommendations to deal with bias

- Tighten governance and make decision-makers more accountable;
- De-bias forecasts of projects with statistics drawn from the results of previous and similar projects using Kahneman's RCF = adding a contingency to a contingency;
- Hence, lift the veil on psychological and political causes of underperformance

Note: Heuristics are bad; e.g., "Your biggest risk is you!"

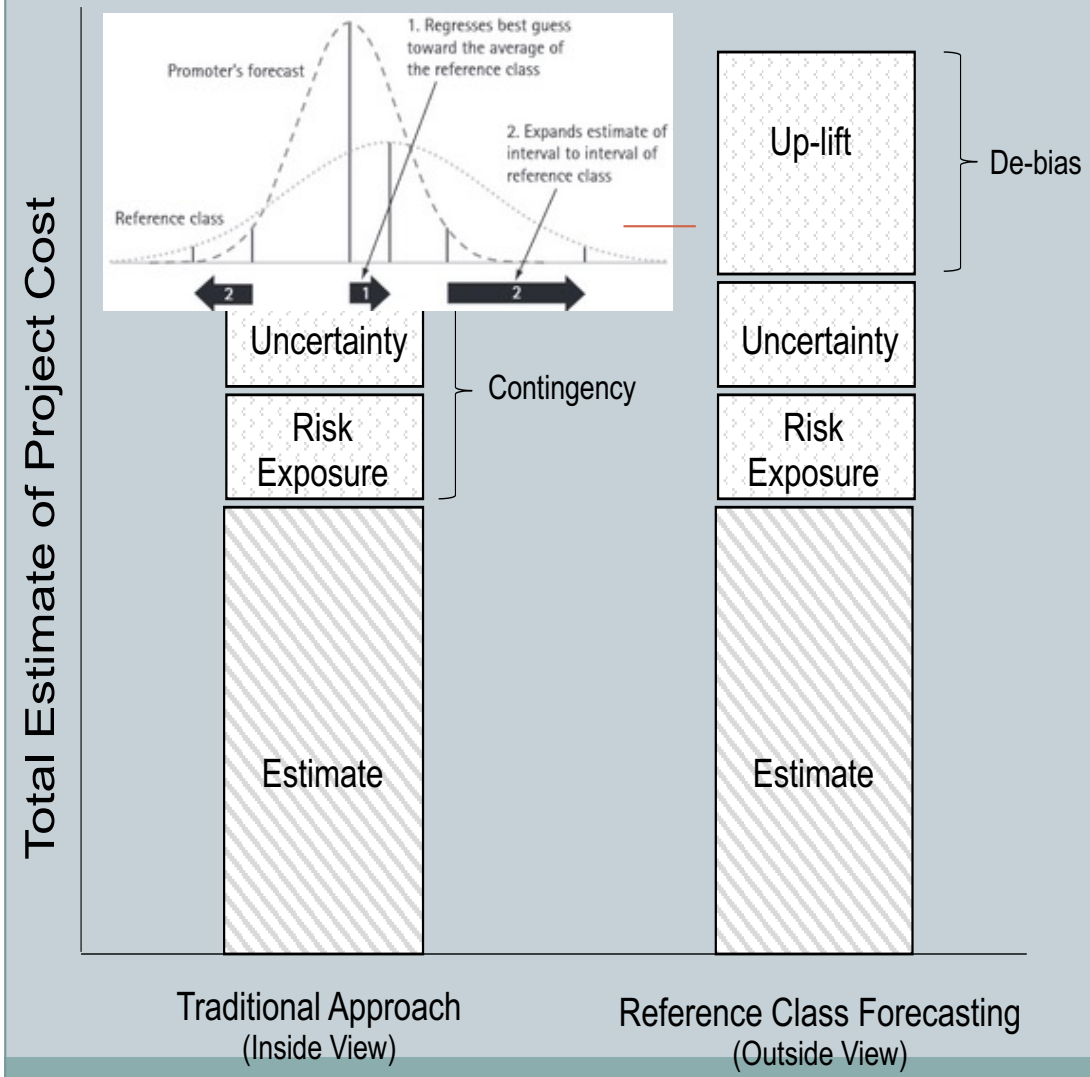
Recommendationx to deal with error

- Tighten up, for example, cost forecasting and project implementation in order
- Use best practices
- Hence, counteract slippages due to technical and economic causes

Note: Plan your work, work your plan. But be ready for welcome and unwelcome surprises

Reference class forecasting (RCF)

Predicting the future by looking at similar past situations and their outcomes.



Adapted from Flyvbjerg and COWI (2004)

Risk

How should we make decisions when all relevant alternatives, consequences, and probabilities are known? (i.e., this requires statistical thinking).

Uncertainty

How should we make decisions when NOT all alternatives, consequences, and probabilities are known (i.e., this requires heuristics and intuition)

Do best practices work? Major setbacks of the error school: e.g., Boston Big Dig

Does RCF work? Major setbacks of the bias school e.g., Edinburgh Tram

Asking the wrong questions leads to creating the wrong solutions (Ika, Love, and Pinto, 2021; Love, Ika, and Pinto, 2022a,b)

- **Problem**: Cost underestimation, not cost overrun

- **Detrimental heuristics view**: "Your biggest risk is you!"

- **Question**: So, before you make that big decision, ask yourself: how can you guard against cost and benefit underestimation?

- **Solution**: Kahneman's "Outside view" thus RCF (Flyvbjerg et al., 2018)

A post hoc, stopgap or short-term solution to a recurring problem, a contingency on a contingency, an inflator device

Five problematic issues with RCF (Love, Pinto, and Ika, 2022a,b, c)

- Cost estimators may be equally subject to pessimism bias.
- The risk-uncertainty distinction is often overlooked yet carbon copy replication of cost, benefit, and risk patterns is key in major, past/similar projects.
- Optimism bias is assumed to prevail at the collective level.
- The assumption of bias is itself a biased assumption
- **Heuristics are always bad or second-best**

If both bias and error are at play, then there is a need to reconcile them; hence the Fifth Hand can help! (Ika, Love, and Pinto, 2021)

It's all about both bias and error

- Bias and error combine to exact a heavy toll on projects

- It is not either the Planning Fallacy or the Hiding Hand, bias or error, but both; hence the need to reconcile bias and error, risk and uncertainty, and thus RCF and heuristics. Hence the Fifth Hand! But how?

Heuristics can be beneficial and outweigh probabilistic models

- Uncertainty is at the core of the Fifth Hand, which is based on ecological rationality, or the understanding of the circumstances in which bias and error work or not (Gigerenzer, 2013)

Why the name Fifth Hand for a new principle of project behavior? (see Ika, Love and Pinto, 2021)

Project complexity	Uncertainty (or state of knowledge)	
	Ignorance	Awareness
Underestimation	Hiding Hand Making active problem-solving possible in the face of ignorance	Malevolent Hand (or Planning Fallacy) Exploiting the ignorance of third parties for profiteering sake
Overestimation	Protecting Hand Tackling ignorance through risk management and worst-case scenario planning	Passive Hand Stifling creativity and avoiding risks

How heuristics can help reconcile the bias and error debate ?

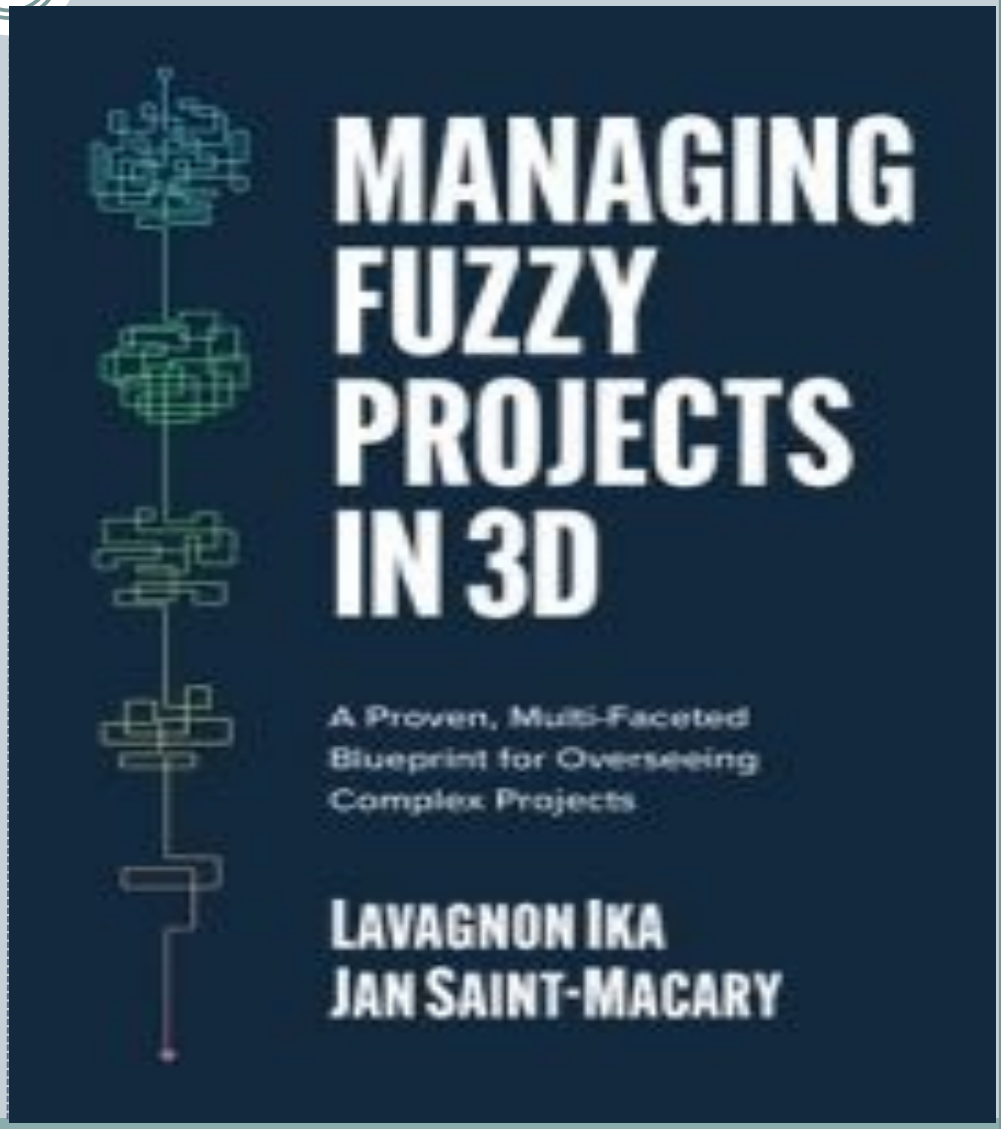
"Catching a frisbee is difficult. Doing so successfully requires the catcher to weigh a complex array of physical and atmospheric factors, among them wind speed and frisbee rotation. Were a physicist to write down frisbee-catching as an optimal control problem, they would need to understand and apply Newton's Law of Gravity. Yet despite this complexity, catching a frisbee is remarkably common. Casual empiricism reveals that it is not an activity only undertaken by those with a Doctorate in physics. It is a task that an average dog can master. Indeed some, such as border collies, are better at frisbee-catching than humans."

Andrew Haldane, 2012: "The dog and the frisbee",
Wall Street Journal "Speech of the Year

Consider the example of a gaze heuristic!

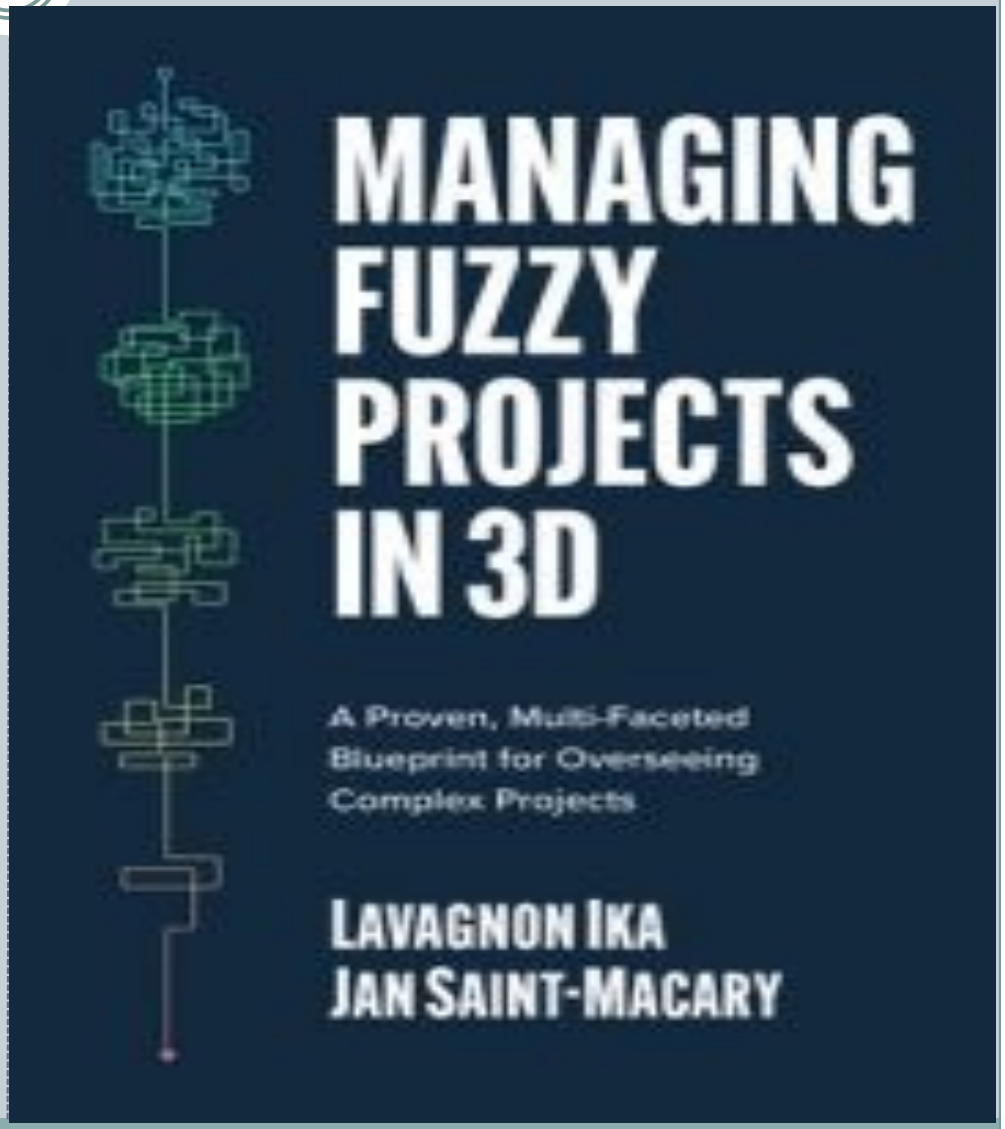
"Gaze heuristic refers to how a complex problem can be mastered—for example, catching a Frisbee in a natural and complex environment.

The dog runs at a speed that maintains its gaze on the Frisbee at a roughly constant angle, **ignoring all complex data.** The logic is that the less information, the better decision-making (**less is more**). The dog focuses on a satisfactory solution (**satisficing**) and acts on it. For if dogs, like baseball players, could systematically predict the trajectory of the ball or Frisbee, there would be no need for heuristics" (Ika & Saint-Macary, 2023 based on Gigerenzer, 2014).



A need to build an adaptive toolbox: RCF and logical rationality under risk versus "fast-and-frugal" heuristics and ecological rationality under uncertainty (Love et al., 2022, a,b,c)

- RCF based on probability theory or logical rationality; it proffers a gloomy view where people are bad at decision making; people are misled by their gut feelings; **so heuristics are bad or second best** (Tversky & Kahneman)
- Fast-and-frugal heuristics are smart rules of thumb or "simple, task-specific decision strategies that are part of a decision maker's repertoire of cognitive strategies for solving judgment and decision tasks" and that "yield decisions that are ecologically rational rather than logically consistent"; **so heuristics are good and lead to more accurate decisions**
- RCF may work best under risk and heuristics under uncertainty (Ika & Feeny, 2022)

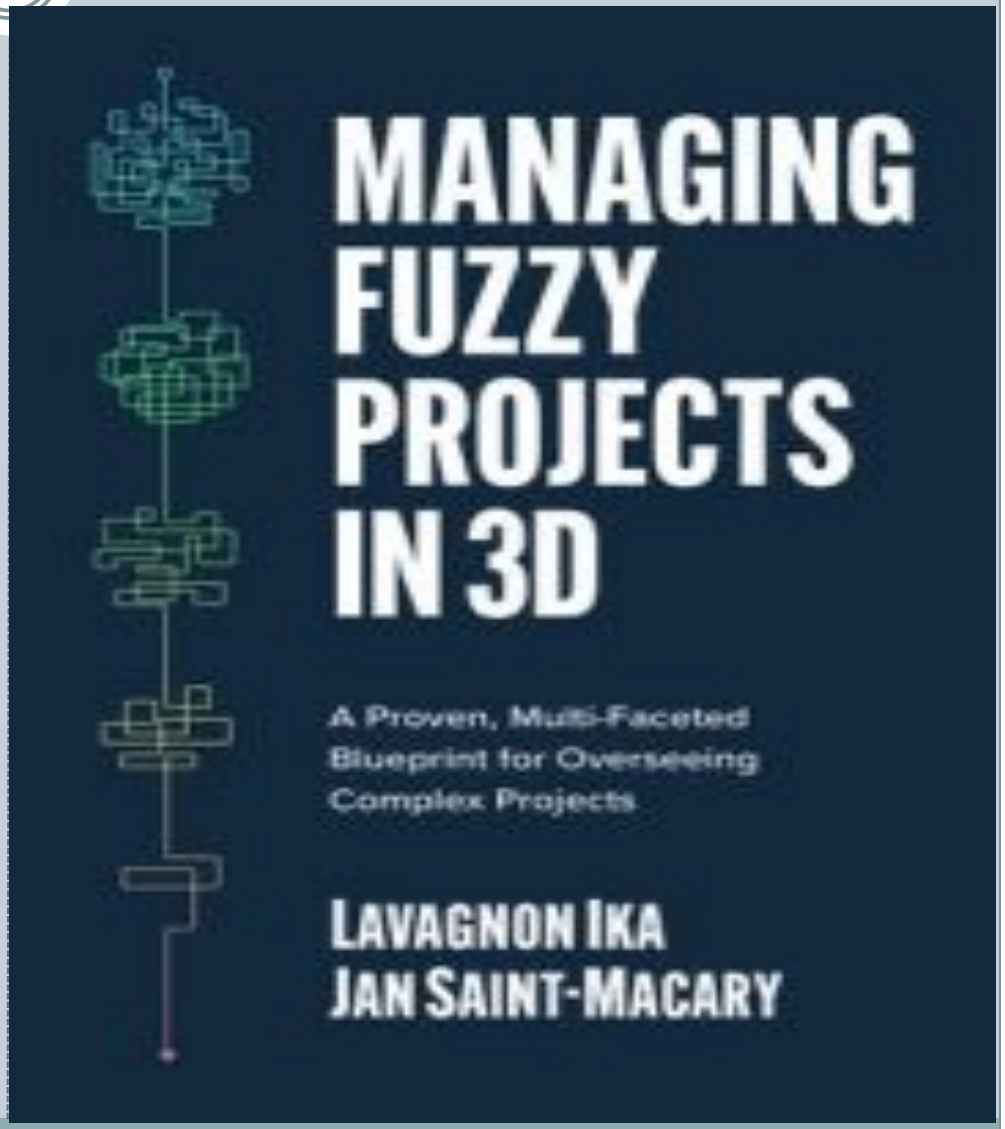


Examples of such fast-and-frugal heuristics in cost contingency estimation (Love, Ika, & Pinto, 2022a,b,c)

Heuristic	Definition	Appropriate environment	Hypothetical scenario
Recognition (Goldstein and Gigerenzer, 2002)	If option a is recognized over b, then it has higher value on the criterion	Recognition validity >0.5	Identify a light transit rail (LRT) project experiencing a cost overrun. Add a contingency percentage based on the selected project's estimator's experience and understanding of the chosen LRT
Satisficing (Simon, 1955)	Search through options but stop when the first option exceeds aspiration level	Decreasing populations	Identify an LRT project with a cost overrun profile similar to a project whose contingency is to be estimated. Apply a contingency percentage
Take-the-best (Goldstein and Gigerenzer, 1996)	Infer which of two alternatives has the higher values by; (a) assessing through cues in order of validity; (b)stopping the search as a cue discriminates; and (c) choosing the alternative this cue favor	Cue validities vary highly; moderate to high redundancy, scare information	Two types of rail cars are considered for LRT. The attribute of lead-in time is considered (i.e., cue). The option with the earliest delivery is selected.

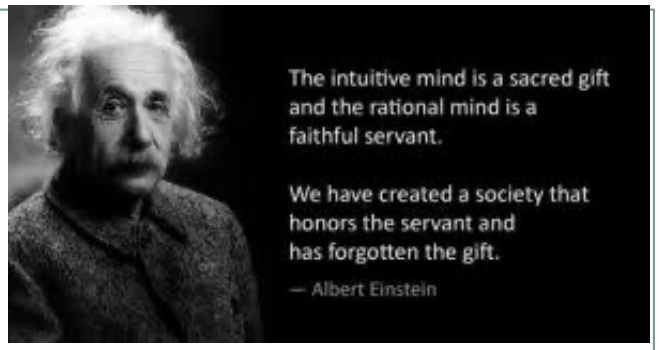
Examples of heuristics from my research over the years

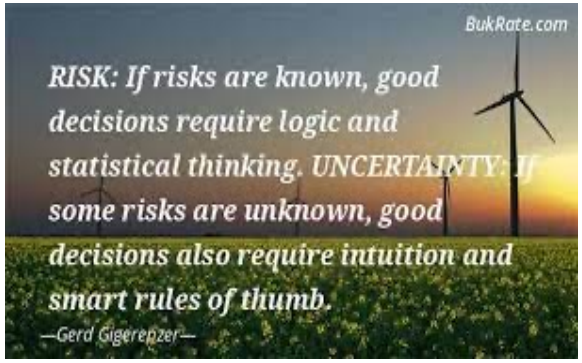
- Plan your work, work your plan
- But be ready for welcome and unwelcome surprises down the road
- Understand, reduce, and respond
- Understand, embrace, and adapt
- You do not do projects for the eggs. It's all about benefits!
- First is not best.
- Why always trumps what. So, always ask why.
- Don't underestimate the estimate
- Your biggest risk may be you but your biggest asset is also you.



TELFER

BUSINESS FOR A BETTER CANADA





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