International Journal of Project Management, Volume 29, Issue 8, December 2011, Pages 1070-1081

Performers, trackers, lemmings and the lost: sustained false optimism in forecasting project outcomes – evidence from a quasi-experiment

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ABSTRACT

The consistently successful delivery of projects remains an ambition that many organisations do not achieve. Whilst the reasons behind project failure are many, one recognised factor is the 'planning fallacy' – over-optimism in the planning phase of a project. Whilst the planning phase of a project may be a battle for acceptance and resource allocation, the execution phase is a battle for delivery. Based on both qualitative and quantitative data gathered from a project management simulation, this study set out to establish whether optimism bias persists beyond the planning phase and into the execution phase, and, if so, to explore the reasons why. The results confirm the extent and impact of optimism bias in initial project planning. More importantly, the contribution of this study is to demonstrate on-going or sustained false optimism.

Keywords: Project, Optimism, Psychological bias, Experiment

INTRODUCTION

Widespread project failure is an organisational and individual problem that warrants examination. At its most simple, in a failed project, targets are set for key parameters – classically cost, time and benefits – and then these are missed. Logically, there are two reasons for missing a target – either it was not attainable in the first place, or the implementation suffered failure of some kind.

The first of these causes – how targets are set through planning and approval processes – has been well explored. Of particular interest to this paper is that behavioural interventions have been shown to be present in the project planning and approval processes. These include 'delusional optimism' on the part of stakeholder groups – planners, managers and assessors. The effect of this is to make planning and approval processes far less effective than expected.

The second of the causes – the process of implementing projects – is also less effective than expected. Our contention is that understanding implementation failures is just as important as the planning and approval process, and that there are behavioural interventions that contribute to this. This paper considers the role of delusional optimism in the project implementation.

The literature shows that the source of this optimism is made up of three components: technical error, political or strategic misrepresentation, and psychological bias. This paper reports on a study in which we take an unprecedented opportunity to eliminate two of these sources and focus on the psychological bias component of this error, to investigate whether it persists over the life-cycle of a project. We report the results of a quasi-experiment using both quantitative and qualitative data gathered from 28 teams performing a profit-maximising project simulation. All teams were fully familiarised with the

prescribed techniques to plan and control the simulated project. Each team received the same (near perfect) information, was given time to prepare their plans, and was required to make profit predictions both initially and after each round of the simulation.

Only seven teams achieved a result consistent with or better than their initial forecasts – these were the '*performers*'. The remaining 75% of teams had over-estimated their performance by more than 20% – in most cases, substantially more. They had exhibited optimism bias. This was to be expected. The interest for this study was in the pattern of how this optimism changed during project implementation. The differences in the behaviours of these teams were notable. A second cluster recognised from a fairly early stage that they wouldn't make their profit forecasts and revised their forecasts downwards accordingly. They were still overly optimistic about their performance, but did make profit adjustments in the right direction. These were the *'trackers'*. A third cluster, despite getting feedback both from the performance data and the tutors indicating that the group was going to under-perform, did not represent this in their ongoing predictions. Indeed all of these teams came to a point late in the simulation where their profit predictions were seen to 'fall off a cliff.' This cluster we termed the *'lemmings'.* A fourth cluster, once they realised they were not going to hit their target, abandoned the reporting process altogether. These were the *'lost'*.

Qualitative data collected during the study, demonstrate that expertise in the 'know-how' to apply planning tools and the 'know-what' about the parameters of the project reinforces sustained false optimism. Paradoxically, instead of providing realism and planning accuracy, the perceived ease of use and usefulness of planning tools reinforced a false sense of certainty on the part of

these teams. The implications of such behaviours for managers are discussed. Most significantly, whilst there are now corrective factors applied to estimates for large capital projects relating to initial estimation bias, there is potential benefit to correct for sustained false optimism, either through identifying and preventing its causes, or accepting and compensating for its effects.

The intention of the paper is to explore sustained false optimism in projects. The review of current literature is followed by an evaluation of the method of a quasi-experiment. The results section offers a fourfold classification of sustained false optimism and its interpretation. The implications and contributions are discussed; the contribution of this paper is in confirming the presence of what we have termed, *sustained false optimism* during project implementation, and some indications of the contributors to this. We describe the challenges that this provides for organisations and conclude with directions for further research.

PROJECT PERFORMANCE

A project is a "vehicle of change", which needs to be delivered in a defined time at an agreed cost (Buttrick, 1997, p. 20). Key features characterising a project are: a project is unique; each one will differ from every other in some respect; projects have specific objectives (or goals) to achieve; they require resources and have budgets; they have schedules and require the effort of people; and, measures of quality apply (Field and Keller, 1998). However, these common elements of a project are also included in routine operations except for one – uniqueness (Turner, 1993). In contrast to a "pure" operation, a project includes a certain degree of uniqueness and dissimilarity as Cicmil (1997, p. 392) notes:

> "In any project situation, there is always someone (the client, customer) who has a unique need (an idea) for something new, and some, often vague, expectations about tangible outcomes (the creation) of it…"

This level of uniqueness, potentially poorly defined expectations, combined with fundamental uncertainties about the future mean that estimations of outcomes are needed to determine whether a project business case is viable. If accepted, these estimates typically become the measure for success against which the project will be assessed. The compilation and treatment of forecasts then has a direct impact on whether a project goes ahead and whether it is perceived as a success or a failure when complete. The volume of projects that are perceived as failures means that the generation and treatment of estimates is worth studying.

INACCURACIES IN FORECASTS

An inaccurate forecast is one where the project actual outturn deviates from the planned or expected outcome. It has been recognised for some time that inaccuracies in forecasts are problematic (e.g. Flyvbjerg et al., 2006, Kemerer, 1991). Road, rail, building and IT projects alike suffer under inaccurate forecasts (H. M. Treasury, 2003, MacDonald, 2002): *"There is a demonstrated, systematic, tendency for project appraisers to be overly optimistic"*. (H. M. Treasury, 2003, p. 2). Project appraisers – planners, managers, sponsors and others – are over-optimistic in their forecasts as to when projects will be completed, within what budget and of what quality (Flyvbjerg et al., 2002, Schnaars, 1989). Flyvbjerg et al. (2002, p. 286) suggest the following about the persistent trend towards underestimation in transportation infrastructure projects:

> "No learning seems to take place in this important and highly costly sector of private decision making. This seems strange and invites speculation that the persistent existence over time, location, and project type of significant and widespread cost under-estimation is a sign that an equilibrium has been reached: Strong incentives and weak dis-incentives for under-estimation may have taught project promoters what there is to learn, namely that cost under-estimation pays off."

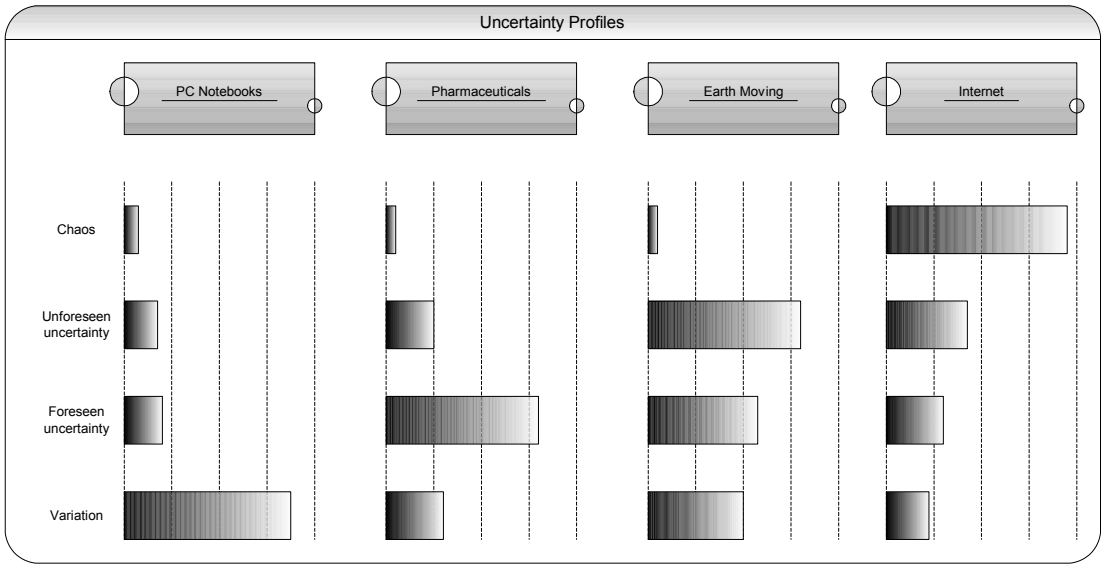
Optimism may have both beneficial (Armor and Zanna, 1998) and harmful consequences (Baumeister et al., 1993). The overestimation of estimates such as project costs may reduce the pressure on project members to be productive (Abdel-Hamid, 1986). Underestimated project cost estimates may enable organisations to competitively bid for business, even though the winning bidder may be the one with the worst prospect of profit (Mumpower, 1991, Thaler, 1988). Current research literature provides a number of explanations for optimism bias (Buehler and Griffin, 2003, Connolly and Dean, 1997) as being either technical, political or psychological in nature. Understanding these in isolation is a first step and one to which we are contributing in this paper. Understanding how these effects combine will be an interesting field for further study.

Technical

Forecasting inaccuracies are suggested by some studies (e.g. Morris and Hough, 1987) to be caused by technical errors. 'Technical error' refers to unreliable or inaccurate data, the absence of data or the use of imperfect forecasting techniques.

The lack of reliable or accurate data (e.g. from previous projects) may be due to the context in which forecasting is applied. Meyer et al. (2002) compare new product development projects in four industries in terms of four dimensions – the level of chaos (unpredictability in the initial and underlying conditions), unforeseen uncertainty (the level of unpredictable emergence during the project), foreseen uncertainty (the level of predictable emergence during the project) and the level of variation (the difference between this and previous projects). Their study demonstrated a problem for forecasting in the internet industry in particular – where there was a high level of chaos which would prevent accurate forecasting (see Figure 1).

Figure 1: Uncertainty profiles (Meyer, Loch, & Pich, 2002, p. 96)



High levels of chaos mean that project planners rely on the validity of probabilistic conclusions of future events which are based on historical data (Frosdick, 1997). In this respect Shakle (1952, p. 5) states:

> "The theory of probability, in the form which has been given to it by mathematicians and actuaries, is adapted to discovering the tendencies of a given system under indefinitely repeated trials or experiments. In any set of such trials, each trial is, for the purpose of discovering such a

> tendency, given equal weight with all the others. No individual trial is considered to have any importance in itself for its own sake, and any tendency which may be inductively discovered or predicted as a priority for the system, tells us nothing about any single individual trial which we may propose to make in the future."

The degree of chaos, particularly in internet projects, implies that forecasts remain inaccurate. Although perfect knowledge about the future state of an environment is not possible, technical errors and consequently over and underestimation of project forecasts will occur despite attempts at correction through clarification and exactitude. However, based on empirical testing of data, technical explanations for optimism bias may be less important than they appear. Firstly, if technical error is the reason for inaccuracy, one would expect an equal spread of optimism and pessimism over time. However, empirical findings show a significant tendency towards optimistic forecasts. There are clearly other contributors here – political and/or psychological biases (Flyvbjerg et al., 2006, Flyvbjerg, 2006).

During project implementation, there are a number of techniques which attempt to correct future predictions of project outcome based on current performance. For example, Earned Value management integrates cost, schedule and technical performance and has been widely used for forecasting project durations. The Earned Value method provides early indications of project performance to highlight the need for corrective action (Fleming and Koppelman, 1996). However, employing Earned Value has had limited success in improving the accuracy of on-going project estimates (Boehm and DeMarco, 1997, DeMarco, 1982).

Political

Some researchers have stated that there are systemic problems in providing project forecasts, even to the point where purposeful underestimation of costs and overestimation of scope and time are common to gain project approval and funding (Wachs, 1989). Frequently, pre-sales teams and/or project managers, eager to get projects funded, resort to a form of deception (Cliffe et al., 2000), over-promising what their project will do, understating how much it will cost, and when it will be completed. Many projects start off with budgets that are too small (Flyvbjerg et al., 2003). In the planning phase, project proposals are not fully explored because of the nature of the bidding process to over-promise in order to win funding and the frequent need for a rapid response. With the benefit of hindsight, project managers often believe that they have taken on an overly ambitious project, committed to by, for instance, a pre-sales team (Taylor, 2006).

How this bias plays out during project implementation is not clear, though there are clearly issues with the 'acceptability' of reports by different stakeholders. This will be an area for further research.

Psychological

Political 'deception' of project forecasts is an intentional behavioural strategy; conscious bias is introduced to increase the probability of gaining project acceptance. In contrast, psychological bias subconsciously introduces optimism into initial forecasts. Our purpose here is to determine whether there is any evidence that psychological bias should end once initial planning is complete, and to understand some of the factors that may drive this bias to be evident in project execution.

Yates (1990) confirmed the presence of two factors that are relevant here: over-optimism in estimates, and overconfidence in the reliability of those estimates. The causes behind these two factors have been studied extensively. For instance, when considering future events, people generally have an overly positive view of themselves, seeing their outcomes as being more positive than those of other people. They see themselves as less likely to experience negative events and more likely to experience positive events. Known as the 'planning fallacy', Tversky and Kahneman (1974) analysed everyday planning practices and determined that people generate overly confident and optimistic predictions because they accentuate their talents and the degree of control they have over the environment (inside view) and neglect or avoid evidence about past prediction failure in similar tasks (outside view) (Ying et al., 2006).

The dissociation of the past from the present and the strong focus on future plan-based outcomes is magnified by the need of the decision-makers to act. Doubts about decisions are downgraded and suppressed through wishful thinking and the illusion of control (Slovic, 1987, Slovic et al., 1980). The bias towards positive stimuli relates to the temptation to give people the answers they want to hear, and those answers to have apparent certainty or a perception of a safe and predictable world (Beierle, 2004).

In addition, individuals tend to fall prey to a host of self-deceptions which lead to pervasive optimism bias (Sitkin and Weingart, 1995). For example, when considering future life-events, such as divorce or serious illness, people generally have an overly positive view of themselves, seeing their outcomes as being more positive than those of other people. They see themselves as less likely to experience negative events and more likely to experience positive events. This

phenomenon has been described as *unrealistic optimism* (Royer, 2000) or *comparative optimism* (Weinstein, 1980).

For the purpose of this study, we have identified from the literature five key contributors to delusional optimism that would be present in the context of project delivery. First, people's predictions tend to mirror hopes and ambitions for desired outcomes. Rather than considering past outcomes, wishful thinking is applied and current intentions are projected into desirable outcomes of future events. This cognitive process of *motivated reasoning* has been described in detail by Waerneryd (1996) and others (e.g. Pidgeon et al., 1983). A recent study by Sitkin and Weingart (1995) has shown that when developing mental models of scenarios in which positive future events occur, certain parts of the brain are more active then when imagining negative future events or past events.

Second, based on attribution theory, individuals tend to ascribe successes and failures related to past events to different factors. Frequently, successes are attributed to internal causes such as personal ability and resilience, while failures are attributed to external forces, such as unfortunate circumstances or a particularly difficult task (Pablo, 1999). Individuals' explanations of why successes or failures occurred have an important effect on whether information about a past event will be considered important for the prediction of an outcome of a future event. In particular, past events will be considered of little importance when their failure is attributed to external factors and/or when implications of the past project could challenge optimistic future plans (Jaafari, 2001). We term this factor *outcome attribution.*

Third, individuals tend to overestimate their personal role in positive outcomes related to events of the past. They perceive their contributions to be bigger than warranted. This misperception leads them to believe that their locus of control to steer a scenario toward a desired outcome is greater than warranted by objective judgement (Jaafari, 2001). This individual bias is also called the *egocentricity bias* (Livingstone Smith, 2004).

Fourth, the expectancy-value model suggests that individuals who are high in dispositional optimism versus dispositional pessimism are better at identifying suitable goals. They have great confidence in achieving that goal and are resilient in pursuing it. However, when they are not able to identify an attainable goal, these individuals tend to stay committed to the unattainable goal or disengage from goal attainment (give up on the project) (Jemison, 1987). This is the *paradox of dispositional optimism*.

Fifth, offering a general model for the generation of expectations, Krizan and Windschitl (2007) suggest nine mediators influencing individuals' likely judgements for expected outcomes (*outcome desirability)*. Based on this model, people go through three basic cognitive mechanisms in order to form expectations. During the first stage a search for evidence is undertaken. This search will favour knowledge which is consistent with the desired outcome and therefore it promotes optimism bias, just as repeated simulation of the scenario and focusing on a particular entity tend to do. In phase two of expectation formation, selected evidence will be evaluated. At this point in the process, information will then enter the third phase and either undergo differential scrutiny or enhanced accuracy, once again leading to bias.

In summary, optimism bias is clearly commonly observed and well understood in many fields of human activity. None of the factors identified here as leading to delusional optimism (motivated reasoning, outcome attribution, egocentricity bias, the paradox of dispositional optimism, outcome desirability) could be said to end with the end of the planning stage of a project. Previous studies (e.g. Flyvbjerg, 2006, Kemerer, 1991, MacDonald, 2002, H. M. Treasury, 2003) have focused on biases inherent in the act of planning. Little attention has been paid to project execution where project managers take evidence about the progress of the project into account. Project execution is usually the longest phase in the project life cycle and it typically consumes the most energy and the most resources. However, recent studies have failed to illustrate to what extent optimism continues into this phase and if it does, the nature of the psychological bias that accompanies it.

Hence, our research question is *'Does on-going optimism occur during project execution and if it does, what is the nature of the psychological bias in this sustained optimism?'* The author team have seen that sustained false optimism was often present in practice, but such anecdotal evidence was not amenable to further analysis. The opportunity presented itself for an attempt to isolate the phenomenon, and explore it a little further in a controlled environment.

METHODS

The data for this study were gathered from a project management simulation. In this competitive exercise 28 teams of six students planned and executed the simulated construction of a warehouse under a fixed price contract. The profile of the students who participated is as follows:

Table 1: Profile of sample

Average Age		Work experience		Job function	
25-28 years	24%	**0-2 years**	0%	**General Management**	27%
		3-5 years	30%		
29-32 years	37%	**6-10 years**	44%	**Project Management**	7%
33-36 years	27%	**11+ years**	26%	**HR**	2%
37+ years	12%			**Sales/Marketing**	12%
				Research and Development	4%
				IT	10%
				Business Development	5%
				Consulting/Management Services	12%
				Finance/Banking	10%
				Scientific Engineering	11%

The participants have a minimum of three years' work experience with over 90% having worked in an environment that included some form of project planning and control. Our first task in the design of the experiment was that in order to isolate psychological reasons for sustained optimism, political and technical influences had to be avoided. Purposeful over-promising can be excluded because external stakeholders were not part of the simulation and although it was a competition, there was neither motivation nor any indication that the participants deliberately inflated their targets. Experiential and technical reasons, however, such as the issue of knowing-what (e.g. knowledge) and knowing-how (e.g. skill), needed to be addressed in order to avoid any distortion of results. In particular during the planning stage but also during the execution phase, coaching on technical matters of planning was provided by the tutors.

Specifically, in order to plan the entire project, the students were introduced to a scheduling technique, cash-flow analysis and Earned Value management as a control tool. The planning stage of the simulation included extensive practice of the prescribed tools and techniques. The students carried out 'dry-runs' and enquiries about how to apply a technique were fully addressed. Teams were

required to demonstrate use of the tools and this was checked by the tutors. All teams were provided with detailed information on the project such as financial constraints, the sequence of work and labour requirements for each package of work several days in advance of the exercise to allow time for planning. During the simulation, the cost of workers, price of materials and lead-times was fixed. The only type of variability was the non-linear progress of work packages.

The execution phase of the simulation was run over one day, with teams going through approximately 20 15-minute decision cycles, depending on how they planned and executed the project. Each cycle required the teams to take decisions about finance arrangements, the acquisition deployment and disposal of project resources (e.g. labour, construction equipment, consumables) together with a profit forecast. Each team recorded their decisions on a form which was handed to the course tutors, who processed the data and provided a progress report at the end of each cycle. The form also requested the students to indicate whether and how their final profit will change. This allowed us to track the on-going pattern of any optimism in their forecasts. In addition to this quantitative data on performance, we also collected qualitative data. The qualitative data took the form of short interviews with consenting teams between the submission of a decision form and the return of a progress report from the course tutors. The interviews used the following protocol:-

- 'Please explain your current profit forecast?' **OR**
- 'Please explain why you have changed your profit forecast?'

Follow-up questions were sought to provide further clarification of the reasons behind their statements, for example 'Why is that?' and 'What do you mean by that?' Our intent was to avoid any disruption in the flow of the simulation, so

each interview was limited to a maximum of five minutes. The interviews were recorded for subsequent transcription and analysis. Further data were collected in the form of the teams' reflections on their performance at the end of the simulation – a compulsory activity.

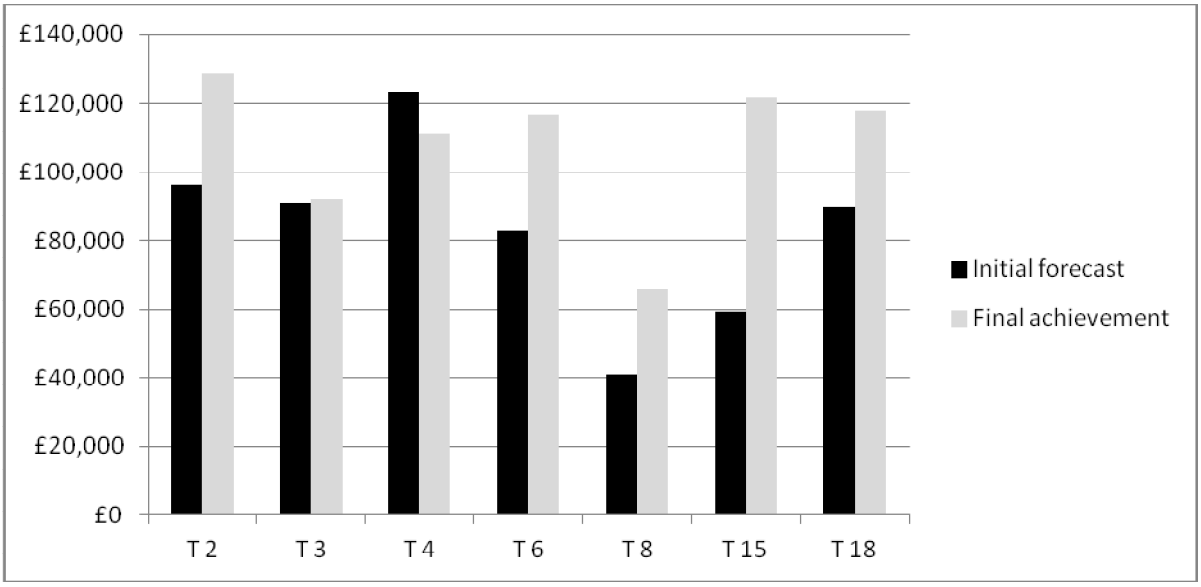
RESULTS

Quantitative analysis

Of the 28 teams, only seven were above or less than 20% below their original profit forecasts. With a mean forecast of £97k profit, but a mean achievement of less than £25k, all the rest of the teams exhibited optimism bias in their initial estimating. Overall, this level of performance is slightly better than historical averages for the simulation (25% achieve their forecasts, average profit £10k). Considering the dataset as a whole, there was no statistically significant correlation established between the initial estimates and the final profit figures achieved – the more optimistic groups were not the better performers.

The most successful of the teams – the seven who delivered above or less than 20% below their initial estimates – are *the performers.* In contrast to the rest of the teams, six from this cluster *underestimated* their final performance. Whilst this is of interest, and will be taken up in 'areas for further research', it is not the focus of this analysis. In particular, the comparison between the routines, practices and behaviours of this cluster with other less successful teams, would be most interesting. The *performers'* forecasts compared to their achievements are shown in Figure 2 and for the purposes of this study this cluster is of no further interest.

Figure 2: Forecast and performance data for performers cluster



That 75% of the teams exhibited significant optimism bias in their initial estimates in itself is of interest, but to answer the research question of whether optimism bias was evident throughout the execution phase, the patterns of prediction and achievement were analysed on a period by period basis for these remaining teams. This analysis indicated three demonstrably different behaviours over time between the remaining teams.

A second cluster of 7 teams was immediately identifiable from the period by period data. They took the feedback they received, and used it to adjust their profit forecasts downwards as they went along. For this reason we have termed these, the *trackers.* Whilst they clearly underperformed compared to initial estimates, their optimism was maintained throughout, albeit reducing as time progressed. Their performance is shown in Figure 3, as for the performers. However, in order to illustrate this behaviour, the patterns in individual groups' performance were found to be far more revealing than aggregated patterns, and an illustrative example from one of the teams is shown in Figure 4. Their level of optimism is represented in the figure by the difference between their period by

period forecast, and their final performance. The chart shows the decline in their optimism, but even at the end, they were still expecting their results to be better than they actually achieved.

Figure 3: Forecast and performance data for trackers cluster

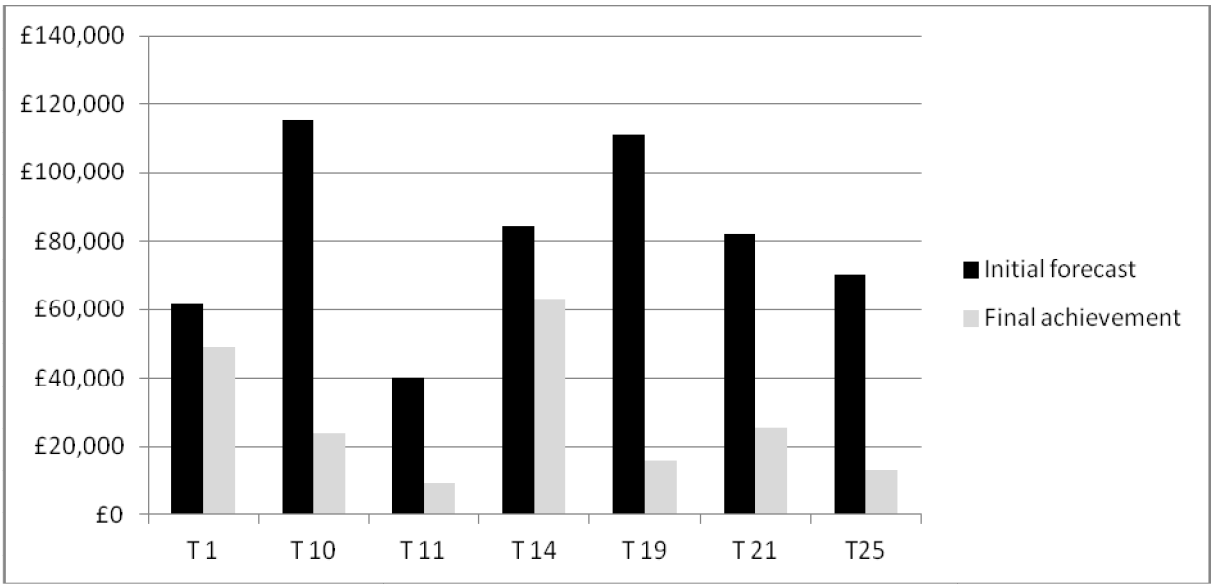
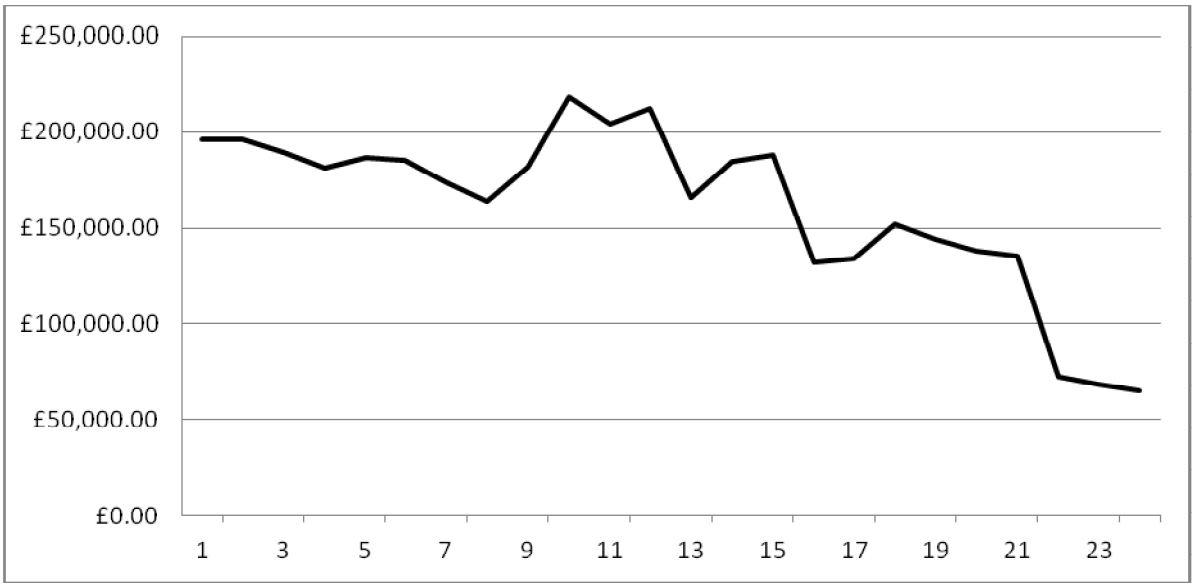


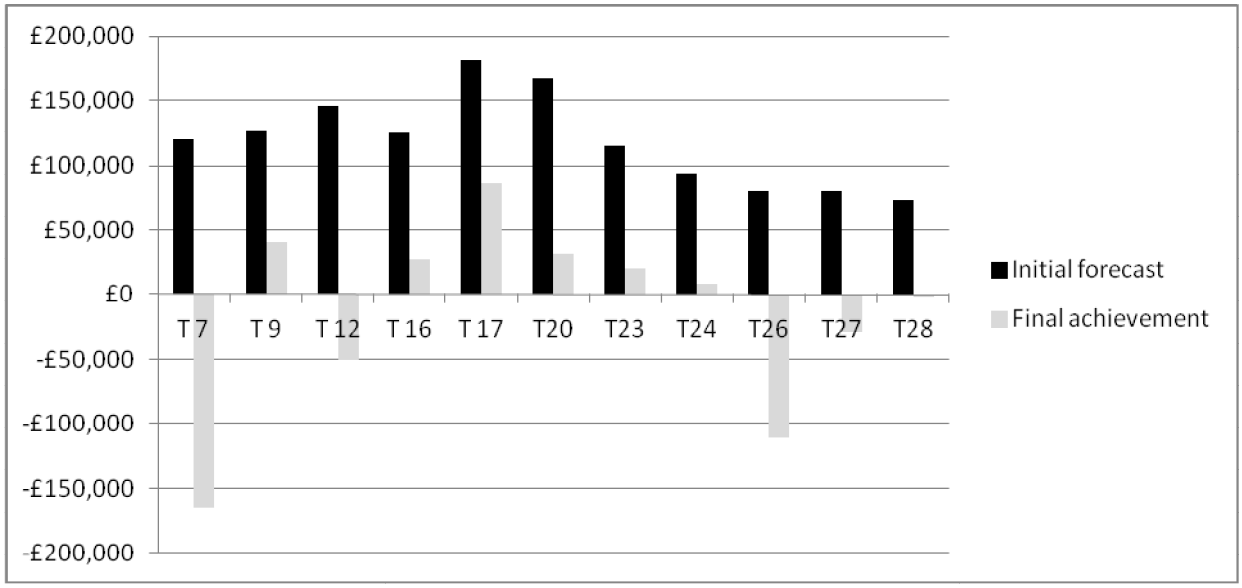
Figure 4: Time-series for optimism - tracker



The third cluster of 11 teams, demonstrated a similarly interesting behaviour pattern. Despite there being no value in maintaining their initial estimates, their adjustments to initial profit forecasts were relatively minor and it was only late in the simulation that significant adjustments downwards were made. In two of these cases, despite evidence that performance was not as they had expected,

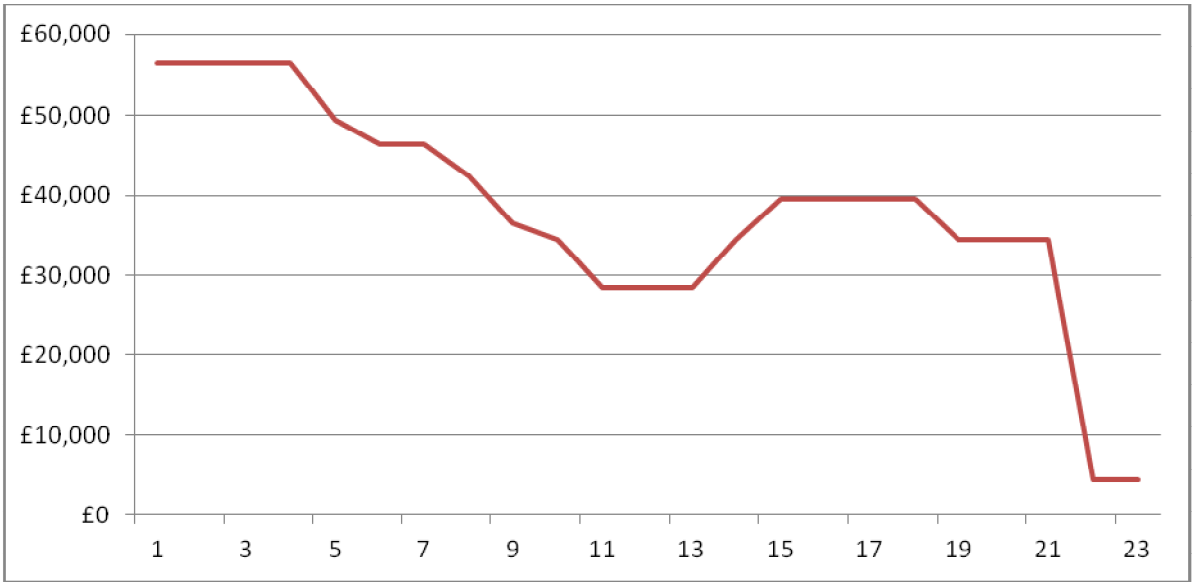
profit forecasts were inexplicably increased, before then being revised downwards. This behaviour was demonstrated by 11 teams, who we have termed the *lemmings* due to their profit forecasts suddenly 'falling off a cliff.'[1] Their overall performance is shown in Figure 5 and an illustrative example of a lemming-type pattern from the data is shown in Figure 6. This includes an unexpected rise in this group's forecast occurring in period 14, and 'the cliff' happening at period 22, two periods before their project was completed. Interestingly here, and different to that of the trackers, the optimism bias appears to have disappeared almost entirely at the point where their estimates are reduced.

Figure 5: Forecast and performance data for lemmings cluster



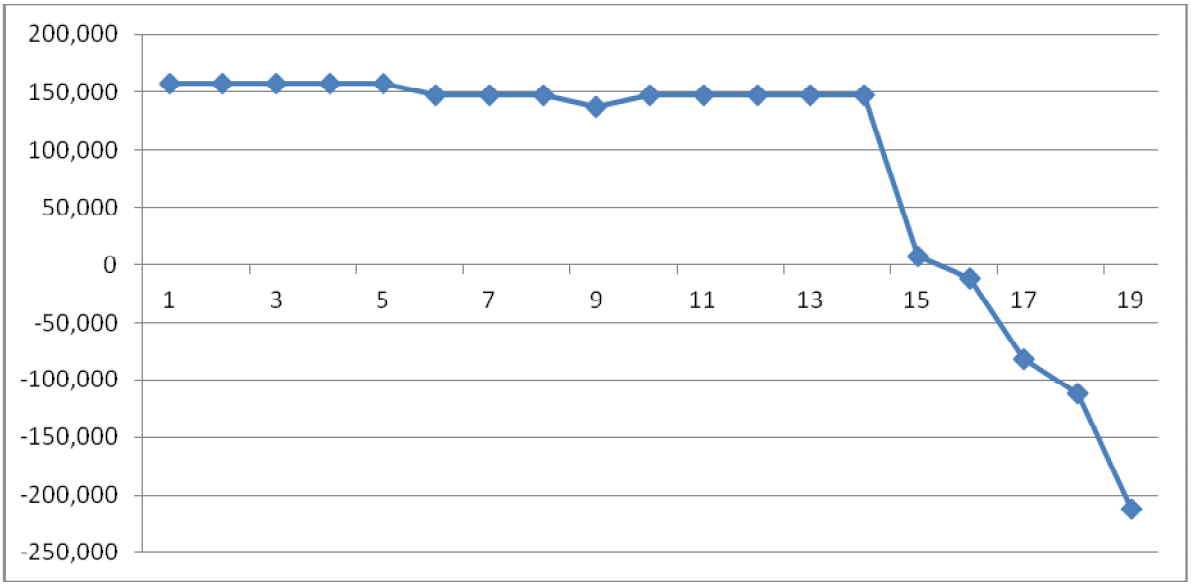
[1] We are aware that this is a mythical property of lemmings.

Figure 6: Time-series for optimism - lemming.



Lastly there were three teams who gave up reporting altogether once it became clear that they were not going to achieve anything like their initial profit targets. This was despite the reports being value-free. Their behaviour was similar to that of the previous clusters, but with the difference that the disappearance of their optimism led to a withdrawal from the reporting process. All of these teams made significant losses. The pattern of optimism in the forecasts from one of the teams is shown in Figure 7. They maintain behaviour as for the lemmings group until period 15. Their optimism disperses over the next two periods before switching to a state of growing pessimism. Their project did not finish until period 22, but they did not report after period 19. Their final result was actually much better than they expected. This cluster we termed the *lost.*

Figure 7: Time-series for optimism - lost.



In this first part of the analysis of this quasi-experiment, we identified four clusters of teams, based on their level of optimism in their on-going forecasts of their profit figures at completion of their project. Of these four clusters, three exhibited the phenomenon that was the subject of this study – what we have termed *sustained false optimism*. The nature of this differed between the clusters; for the trackers, it pervaded throughout the project, though reducing with time; for the lemmings it ended very abruptly; for the lost it ended and then switched to overt pessimism. We are not suggesting these are the only categories of behaviour, or that one group will only exhibit one pattern of behaviour. Indeed, Figure 7 shows a clear example of lemming behaviour up until period 15. Their lapsing into pessimism differentiated their behaviour at the end of the project.

The second part of our research question concerned the nature of the bias.

Qualitative analysis

The data so far have shown the two aspects of optimism bias (optimistic forecasts and overconfidence in their robustness) among the non-performing

teams, as would be expected from the literature (e.g. Yates, 1990). From the literature we also identified five psychological biases that would be relevant to our phenomenon of sustained false optimism – motivated reasoning, outcome attribution, egocentricity bias, paradox of dispositional optimism, and outcome desirability. The data are framed using these categories.

The students took the simulation very seriously, with many groups working late into the night to prepare and hone their plans. Every aspect of the simulation was examined and pored over, often in great detail. As one (typical) student commented:

> "*We think we considered every detail, so we have all the accommodation issues, we pay recruitment fees, we have in the equipment not only the equipment costs but also the issue insurance till the end of the task when the equipment is needed, all the consumables with the respective stock holding costs, cranes. We used supporting tables to help manage all the complicated stuff like consumables, cranes and the details with the workers. Then we have the fixed overheads and then in the end we have information relating to the loans – interest payable, interest receivable. We have a formula …, so it automatically calculates everything.*"

Most teams noted that the prescribed planning tools were easy to use and their effectiveness was rarely questioned. When asked about their confidence in their planning, most did not raise any doubts about the suitability of the applied planning tools. Teams found the tools 'useful' because it enabled them to visualise a previously invisible entity.

In terms of optimism bias, we noted that the planning tools, in most cases, did not prevent optimistic forecasts from being produced. More importantly, the

application of the tools themselves contributed to an artificially high level of confidence in the forecasts. As will be shown, there are a number of reasons for this, with project management tools supporting the psychological biases that have been identified.

Motivated reasoning

This bias is the result of a cerebral process that favours individuals considering positive rather than negative outcomes. A number of the teams exhibited this. When asked about their confidence in the outcome of their planning activities, the majority of teams argued that what they planned would actually occur. Typical responses during the early stages of the project execution included:

> *"There are no big surprises that are coming our way."*
>
> and
>
> *"We know what will be happening."*

The bias and the accompanying rhetoric showed that the positive outcome possibility had prevented the consideration in any detail of potential problems.

Outcome attribution

This bias is where a positive outcome is attributed to the actions of the team, whilst any negative outcome is blamed on external factors. For instance, when questioned about the predictive validity of their forecasts, one team member noted that:

> *"I think it is down mainly to our teamwork, to our pre-planning and basically working to make sure that all processes are working efficiently".*

In addition, although teams revised their plans in order to cope with changes that emerged, they still did not recognise the possibility of further unforeseen events:

> *"Yeah, we're going to have more changes of course, but I think we have a good model here."*
>
> *"…which is a little bit disappointing but again we'd planned for this sort of thing to be happening. So in a way, that's what it's there for, but at the same time, you're kind of regretful that we should have done – we should have made the tool totally foolproof and obviously there was a hole in it. It looked foolproof to start with and obviously something slipped through the net. So, hopefully we've redesigned it, so hopefully it won't happen again."*

Two things are shown here – despite the fact that the models were clearly not working, the belief in 'we have a good model' seemed hard to shake. Furthermore, the failure of the model was not attributed to students' actions, and the redesign re-established its validity.

The belief in the predictive value of their initial planning was reinforced by initial periods of contentment and self-satisfaction. Contingencies were not used and progress was achieved according to plan. Plans were not adjusted and a continuous need for reflection on planning was eroded. Some teams recognised that they had grown complacent because the project had appeared to be proceeding according to plan:

> *"That was the one thing we did, and up until then we had got a bit complacent because everything was really smooth and then all of a sudden… We couldn't work out for two cycles why the performance was so*

slow. So probably with hindsight we would have just integrated something like better check-listing I suppose. But we just got lulled into a false sense of security I think because it was ticking over very nicely."

The language of the teams, justifying their confidence in their planning despite contradicting data, underlines that they were preoccupied with success rather than failure. The sensitivity of their models to unexpected events was downplayed and an illusion of control over uncertainty exercised. Threats were not considered. It appears that any unexpected events were not given credence because it contradicted their established routine; a routine to rigidly follow their plan. Countermeasures to break out of this routine were not observed or only had a little impact on isolated problems for the non-performing teams.

Egocentricity bias

This is the bias that overstates the influence of the individual on the outcome. It was expressed as a notion of being 'in control' by the participating teams and their confidence that their actions through their initial planning were sufficiently robust to absorb any unexpected events. However, as the quantitative analysis shows, not only were the forecasts highly optimistic, despite the inclusion of buffers and contingencies, but teams also tended to under-adjust their predictions. Weak signals such as

"Yeah, we had a slight delay in the progress of the procurement, and the roadwork"

were in many cases ignored; no questions were asked about whether this problem would have a knock-on effect. Indeed, this 'slight delay' would be very likely to completely throw out the plans for the rest of the project. Problems were looked at in isolation, their impacts downplayed:

"It could have been a lot worse"

and further unexpected events were not taken into consideration. Hence, despite the occurrence of surprises in their projects, teams stubbornly argued that they would be able to recover from any future event – overstating their influence on the outcome:

"It's based on our own value up to this point, which is where we said it was going to be. So we're on track for our expected profit at the end."

"All our delays that are happening, we already have a buffer in place for that."

"We have just revisited the spread sheet now and the finances are a little bit off what we predicted, and certainly our forecast is a little bit off what we predicted from the last session."

Paradox of dispositional optimism

This was noted from the literature to be present in groups with high dispositional optimism. Their response to feedback indicating impending failure would then be to continue to hang on to their initial targets until they either finished the project or abandoned their optimism and withdrew from the process. The lemmings group undoubtedly illustrated the former behaviour, whilst the latter was probably best illustrated by the lost groups. They withdrew from the reporting process and were reluctant to offer subsequent comments or to discuss their performance.

Outcome desirability

This is the bias where the wish to be seen as a high-performing team would naturally lead to bias in the reporting of progress. Whilst we have ample

evidence of the competitiveness of the teams, there is little to indicate this as directly having an impact in this study.

DISCUSSION

Our research question is: *'Does on-going optimism occur in project execution and if it does, what is the nature of the psychological bias in this sustained optimism?'* This paper establishes the phenomenon of sustained false optimism – the existence of delusional optimism beyond the planning phase of a project. It also provides qualitative evidence as to 'why', based on the presence of five causes of optimism bias: motivated reasoning, outcome attribution, egocentricity bias, paradox of dispositional optimism and, possibly, outcome desirability.

In the context of this study, optimism bias was observed at a group level. At an individual level, behaviours resulting from optimism bias have been explained by behavioural and social psychology. We propose that throughout the execution of the project simulation students felt prey to a number of cognitive self-deceptions leading to biases similar to those described in the planning fallacy (Kahneman and Tversky, 1979).

The initial profit forecast served as a first reference point and acted as a mental anchor for students. For 75% of the teams, this reference point was highly optimistic. Lovallo and Kahneman (2003, p. 60) report anchoring as "…one of the strongest and most prevalent of cognitive biases" in the context of project planning. Anchoring leads individuals and teams to hold on to forecasts which have been skewed toward optimism in the first place. Subsequently, contingency budgets for possible expansions or problems occurring throughout the project are kept small and frequently prove to be insufficient. The results of this study

suggest anchoring occurs throughout all phases of project execution for a significant proportion of project teams (nearly a third in this study).

Further, our findings suggest that in the non-performing teams, optimism in forecasts was not reduced through the craft of applying forecasting techniques (know-how) and nearly perfect knowledge about the simulated project and its degree of variation (know-what). In contrast, it seems plausible that a high perceived ease of use and perceived usefulness in combination with a high perceived sense of certainty reinforced the sustainment of optimism. Expert-like epistemic and technical arrogance may hence be a factor to critically evaluate.

However, simply accepting that such epistemic and technical arrogance exists, and will persist for a percentage of projects (what this is outside this simulation needs to be established), is a first step to finding approaches to work with this behavioural complexity. Key to this may be *the external view* – being able to bring people into a team who have not been party to earlier optimism or who have not yet developed presumptions towards knowledge and in particular to tools. An expert as such will have the skill to question knowledge and tools alike that are often advocated as 'self-evidently correct' (Williams, 2005).

It may be possible to develop more sophisticated tools that are able to identify behaviours associated with sustained false optimism, and provide incentives for their reduction. Most research suggests that optimism in projects and programmes can be overcome by reducing the behavioural element of bias or by compensating for bias through the inclusion of uplifts. Yet, alongside individual and group-related behavioural issues, this research also provides indications that the applied processes and procedures themselves facilitate the creation of optimistic planning. Prior to anchoring their projections, individuals have to form

expectations in relation to projected outcomes (Krizan and Windschitl, 2007). In the context of this study, the search for evidence may have been influenced by a false sense of security relating to the planning tools and knowledge available throughout the project simulation. After all, the tools were taught as part of a project planning course. Therefore, students have felt throughout the execution phase that the use of these tools would surely lead to success not only in planning, but also during execution of the project simulation. Hence, the taught 'usefulness' by the instructors and the resulting perceived 'usefulness' of processes and procedures to manage uncertainty has partially led to delusional sense increased planning quality and certainty. The self-evident correctness of the applied methods may have reinforced the ignorance of uncertainty. Whether deliberate or accidental, such ignorance needs to be counteracted:

> "As with quality assurance, it is beneficial to have one person whose job is to play devil's advocate – to look for the reason that a project might fail and keep managers and developers from ignoring risks in the planning and execution." (Nelson, 2007, p. 75)

Instead of unilaterally applying uplifts to compensate for optimism bias, the recommended step is to *"Consider whether the optimism bias factor can be reduced according to the extent to which the contributory factors have been managed and mitigated."* (H. M. Treasury, 2003). Similarly, adding more processes is unlikely to be helpful. Recognising and working with behaviours is more likely to improve results.

The implications of these behavioural interventions for project implementation are significant. Having a non-performing project is undesirable, but the behaviours shown here indicate that traditional control systems may be unable to prevent impending failure. A tracker would exhibit significant optimism

throughout the project, as would a lemming. The only difference for the organisation is the timing of the realisation that there is a problem. A lost project, similarly, would be problematic, with optimism preceding withdrawal from the reporting process potentially providing a warning, but again, may be too late for remedial action to be taken. Any of these, both personally for PM professionals and organisationally, are damaging.

Limitations

This study is not without its limitations. As we have already alluded to, carrying out a quasi-experiment as part of an MBA project simulation offered us the unique opportunity to largely exclude the aspects of technical error and strategic misrepresentation in a predominantly linear and predictive environment. However, the environment in which we carried out the experiment will have had an influence on the extent and nature of sustained optimism. For example, the students were prescribed to adhere to a range of planning tools. Such enforcement, although not untypical in real-life projects, may have distorted the participants' perception about their degree of realism.

Conclusions

The contribution of this paper is to show that the previously observed phenomenon of optimism bias is not restricted to the planning phase of projects. Instead, it has been observed, throughout the execution of a project, to be present in a significant group of projects that failed to meet their initial performance forecasts. This we have termed, sustained false optimism. The contribution of psychological bias to this sustained false optimism has been explored.

Whilst tools and techniques – earned value in particular – attempt to predict project out-turn, they do rely on good data. Behavioural interventions, such as those seen in 75% of the teams in this simulation, give an indication of interventions that prevent such 'good data' being presented or used by a team. Gaining an understanding of the cognitive mechanisms that led to such behaviours may help to identify possible remedies in order to better predict project out-turn in the future, or simply stop projects that may otherwise end up as non-performing.

FUTURE RESEARCH

In this study, we have investigated one aspect of sustained false optimism – the contribution of psychological bias. The findings of such a study are clearly indicative rather than comprehensive, and their application in practice is an immediate avenue for further work. Further simulation will also provide additional insights for testing in practice. For instance, future research may include the introduction of external cues – the mean performance in this simulation over hundreds of groups is nearer to a £10k profit. Half the groups in a future study may be given this information, and the response to it studied to see at what point it impacts on their decision-making.

The other contributors to sustaining false optimism – political and technical bias – also need to be considered. Whilst they are well understood for project planning and appraisal, there are important differences in the roles played by key stakeholders in implementation that makes further exploration worthwhile. Following from this, the interaction and combination of these contributors should be examined.

Of the seven teams in the *performers* cluster, six had underestimated their performance. This group is of interest and further work could be conducted to compare their behaviours with those of the other clusters.

Finally, further studies which, like this one, offer opportunities of gathering data from a range of teams performing the planning and execution of similar tasks under similar epistemic conditions are needed to better understand the wider range of 'behavioural interventions' that are evident in projects. Such studies may be carried out in an industrial but controllable setting, with the impact of variables such as task complexity and different tools and techniques of planning, monitoring and controlling, on behaviours evaluated. It does appear that 'self-evident correct processes' are not at all robust with regard to behavioural interventions and this is a rich vein for research in the future.

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