Explaining the suspect behaviour of travel demand forecasters

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Abstract

Thirty years ago scholars first presented convincing evidence that local officials use biased travel demand forecasts to justify decisions based on unstated considerations. Since then, a number of researchers have demonstrated convincingly that travel demand forecasts are systematically optimistic—often wildly so—for reasons that cannot be explained solely by the inherent difficulty of predicting the future. Why do modellers generate biased travel demand forecasts and tolerate the misuse of their work? Data from in-depth interviews with twenty-nine travel demand forecasters throughout the United States and Canada suggest new ways for understanding the suspect behaviour of transportation planning professionals. Those most likely to introduce bias and invite misuse of travel forecasts assume that their technical analyses have little, if any, impact on policy making. For many, this leads to disillusionment and requires responses to cope with feelings of marginalization. Others, untroubled by their apparent lack of influence, are complacent and need ways to avoid the ethical questions of practice. Both types of practitioners circumscribe professional roles and rely on the self-deceptive strategies of evasion and excuse making to mute their own disquieting realities that undermine positive concepts of self. The disillusioned wish not to see that they do not matter and the complacent that they do. Bias and misuse seem to be the unintentional by-products of these attitudes.

Keywords: bias, ethics, forecasting, modelling, self-deception, travel demand.

1 Introduction

Why do modellers generate biased travel demand forecasts and tolerate the misuse of their work? The findings drawn from the interview transcripts of twenty-nine forecasters in the United States and Canada suggest a number of
reasons, which the investigator considers more fully below. More immediately instructive, however, are answers to a secondary research question, “how do travel demand forecasters introduce bias into their work and allow others to misappropriate their analyses?” A fuller and more comprehensive description of modellers’ actions can provide a better understanding of why forecasters do what they do. Of course, without measures of bias it is difficult to say with precision how the individual behaviour of modellers affects their forecasts and how others misuse them. Nonetheless, the reflections and accounts of practice collected for this study do provide the converging evidence necessary to properly develop and support conclusions about how forecasts fail to meet expectations.

2 Introducing bias and inviting misuse

At first review of the transcripts, establishing the link between modeling and forecasting bias is not a particularly challenging task. No less than five modelers provided detailed examples in which colleagues either shopped for favorable input data, relied on unreasonable assumptions or deliberately shaded numbers to support particular policy positions. Perhaps more remarkably, well over one-third of the interview subjects described instances where they had a hand in introducing bias into demand forecasts. Some indirectly acknowledged their complicity by condemning the work they helped to produce. “In my professional experience,” claims a consultant, “every one of the plans to which I’ve been a party had a political spin.” In greater numbers, others tended to be less guarded. These professionals revealed that off-model considerations sometimes influenced their technical work. “I think many of us tended to be on the liberal side of our estimates because we wanted to see the project develop.” In very few cases, admissions went beyond providing a preferred alternative the benefit of the doubt to outright misrepresentation. One was particularly brazen in his account. “I knew what my board wanted and I had the model over there telling me, ‘Hey, I can’t give you the numbers that are going to be that good.’ Well, I’ve had to close the door of my office and go in and totally fabricate numbers.”

Both bias and misuse might also stem from general inattentiveness. Three analysts are direct about their lack of vigilance by simply acknowledging that they do not spend time worrying about bias or misuse. Other indicators are less apparent. In at least five cases, interviewees would not respond directly to questions that ask about sources of bias and, when they did, often would not provide consistent answers (and sometimes not even lucid ones). While this may signal a reticence to be frank, one might also ascribe it to a lack of reflection combined with desire to sound authoritative. If one never thoughtfully considers the issue of bias, it may find its way into forecasts unnoticed by those who prepare them. Four modelers displayed inattentiveness by providing answers to questions that seem at odds with what others observe about travel forecasting. Two put a great deal of blind faith in their colleagues and the profession more generally to identify both inadvertent and deliberate modeling bias. “Others are checking,” explained one such modeler, “so it should be caught.” Focusing on misuse, the others contend, without elaboration, that their work is not used
wrongly even though neither modeler described involvement with the planning process beyond producing forecasts.

Half of the analysts invite misuse of forecasts by circumscribing their professional role. Most commonly, modelers insist that they should be apolitical technicians and only produce requested forecasts. “We should simply present the numbers and then let the process, either the political process or public participation process, determine whether the project should continue.” This response is typical of ten modelers. Three in this group, however, acknowledge at least some responsibility to internally provide direction and voice concerns. Similarly, eight modelers do not believe they are culpable for the misuse of their work and do not concern themselves with how others might misrepresent their forecasts. In every case the respondent assigns that responsibility to someone else or claims the task to be unmanageable. “A million people could take [my work] and march off with it. You don’t have any control over it. It’s public information. You generate it, you try to document it, make clear what your assumptions are, but…it gets used and abused.”

A final way modelers potentially provide an opportunity for others to misuse their work is by overselling the capacity of mathematical models to accurately and precisely predict future ridership and/or traffic flows. In most cases, overselling is a sin of omission, which results when forecasters fail to temper expectations, identify model deficiencies and acknowledge the inherent uncertainty of travel forecasts. Overselling allows partisans to market favorable forecasts as something akin to the results of scientific experimentation. Several modelers suggest as much when they describe how their bosses explain to decision makers that they (i.e., forecasters) are the ones “doing the science.” Without implicating themselves, a handful of analysts claim that overselling is endemic within the forecasting profession. Seven, however, admit that they do little to dispel the “aura of wizardry” that surrounds the numbers they produce. “The modeling process came up with the numbers.’ I will say that at times, because it conveys a sense of authority, especially if you want to make the point. You don’t want to create a lot of issues or challenges.”

3 Threats to ethical behavior

What are the external threats to ethical behavior that force modelers to make sometimes-difficult choices? The data suggest two that place ethical practice at risk—political pressure and indifference. Thirteen of the 29 modelers in this study reported receiving at least some political pressure from management, clients or decision makers to provide forecasts that support favored projects. This is not surprising and supports the findings of others that suggest such pressure is ubiquitous in the field of forecasting.

Indifference, or potential indifference, seems to influence the choices of modelers in three ways. First, it encourages analysts to hide, or at least not acknowledge, the uncertainty of their forecasts. According to many modelers in the sample, “people take numbers literally” and expect modelers to have precise answers like “the turning movements at any intersection 25 years into the
future.” Following up, the interviewer asked, “are agencies forthcoming about the level of uncertainty?” “I think they find if they do that, the whole process loses credibility.” When modelers present their work with ranges or caveats attached and the credibility of the forecast suffers, the argument goes, stakeholders stop paying attention (i.e., become indifferent) to their work. Seven modelers subscribe to this position and over half of these provide examples of where they relied on the authority of the number to deflect criticism. To them, it seems, the perceived price is too high to be forthcoming.

Second, there are indications that the threat of indifference may persuade modelers to remain silent when they encounter poor forecasting or would prefer a different use of their own numbers. To do otherwise, four modelers explained, would be to risk exclusion from the planning process. A number summed up their thoughts on this point by claiming, “you must pick your fights to be effective.” Third, and finally, indifference may actually promote the production of forecasts with higher levels of uncertainty than even modelers may be comfortable providing. One forecaster confessed that he sometimes made forecasts when he felt the resources available to do the job were clearly insufficient and it was better to produce no number than one with outrageously wide confidence intervals. Like those who do not speak up, he explained that failure to provide the requested numbers endangered his participation in the planning process. Although it was rare for analysts to reflect on the ethical dimensions of producing highly inaccurate work, a considerable number (eight) complained that they often did not have the resources to do a good job. In light of this, anything like indifference that unduly threatens modellers’ ability to refuse a job may affect the overall quality of travel demand forecasts.

4 Archetypes, bias and misuse

Based on the taxonomy of practitioners, which emerged from the transcripts, how might one expect the behaviors and external threats that explain bias and misuse to be distributed among modelers of dysfunctional archetypes and to what extent does the data refute or confirm this? Here, there is much to compare theory with action.

4.1 The disillusioned

For disillusioned modellers—both those seeking influence and seeking relevance—the picture of practice is not as rosy and requires some sort of measured response. Influence-seeking forecasters experience varying degrees of political pressure to bias the results of their analyses. Pressure is symptomatic of the political model of decision-making that is a fixture in regions where disillusioned modelers practice. According to this model, decision-makers take a stand on policy choices that technical analyses are not likely to shake. Forecasts then become, borrowing from Weiss [1], “ammunition for the side that finds its conclusions congenial and supportive. Partisans flourish the evidence in an attempt to neutralize opponents, convince waverers, and bolster supporters.”
When technical data does not provide the fodder necessary to support the stands of transportation policy makers, pressure falls on modelers to prepare and present biased forecasts under the guise of technical objectivity. Relevance-seeking modelers, on the other hand, do not generally report pressure to influence the outcomes of their analyses. Their work seems simply to be ignored. Nonetheless, they, too, are disillusioned because they believe, or otherwise suspect, that their forecasts do not play the direct role in policy making that they think they should.

Overall, this state of affairs is likely invalidating for disillusioned forecasters. According to psychologists, this type of dynamic places self-esteem at risk. It may, therefore, force these modelers, each in their own way, to formulate a response that will preserve a positive conception of self. Accordingly, a few disillusioned modelers fight, some take flight, i.e., seek new employment, and the rest find ways to cope. All three modelers who reported instances where they refused to compromise their analyses for the political advantage of bosses or clients come from the ranks of the disillusioned.

Three modellers have either found new employment as travel forecasters or are considering doing so. Perhaps ultimately they will choose to exit the field. Another three have either left forecasting entirely or are seriously contemplating a different career. Sometimes this stems not only from disillusionment, but also of fatigue from trying to ameliorate the most common problems they face in practice. Most revealing is this exchange. “So there is at least a glimmer of hope that what you’re doing in your unit might have some effect on policy?” “It probably won’t be under me because I don’t have the emotional energy to make it happen at this point.” If it represents a brain drain, exits from the travel forecasting field may negatively impact the profession. They could, however, have a cleansing effect should those considering departure see coping as their only alternative. Such is the case since coping behaviors, perhaps more than anything, represent the greatest threat to unbiased forecasting.

Most broadly, coping mechanisms are particular strategies that modelers use to preserve their sense of self when they choose neither to fight nor look elsewhere for better opportunities. Intuitively, coping is a two-step process. Initially, the modeler must act to neutralize the external threats to ethical practice–political pressure and indifference–and then frame their actions in such a way that they preserve self-esteem. Section 5 addresses the latter more fully. The former reflect the many ways, catalogued above, that forecasters introduce bias and invite the misuse of their work. Succumbing to the forces that threaten practice reduces the pressure of politics and indifference, albeit only temporarily.

Because they do not report pressure to influence the results of their analyses, one would not expect the strictly relevance-seeking modelers to have a hand in introducing bias into demand forecasts. This seems generally to be the case. The lone exception is a transit forecaster who responded to pressure by spinning numbers to justify a U.S. Congestion Management and Air Quality (CMAQ) grant–ostensibly an isolated case where his numbers were not entirely ignored. Since overselling is a passive act that depends on the interest and attention of stakeholders, the relevance-seeking should not be represented among those who
act in such a way. Here too, the data seems to support the theory. None of the relevance seeking, including this time those who also seek influence, confessed to or demonstrated overselling.

Finally, among those seeking relevance, one would also not expect cases of inattention to poor forecasting or the misuse of numbers by others because this requires that (a) these forecasters recognize sub-par forecasts and (b) others are interested in their work. The lack of technical competence and the indifference that plague the relevance-seeking suggests that these requirements are rarely, if ever, met. Indeed, there is no evidence on which to conclude that this group is inattentive in this way. These three special cases for relevance-seekers aside, the disillusioned, as a group, do demonstrate all the actions that can lead to bias and misuse.

### 4.2 The complacent

With few exceptions, it seems reasonable to expect that complacent modelers, who neither claim nor seek influence on policy, will be inattentive to what their forecasts say and how others use their numbers. In theory, the ethical questions—from a teleological perspective, anyway—cease to exist if they believe that their work has little or no impact. This frees them to practice without concern for issues of right and good. For the data to fit, however, a different interpretation of complacent modelers’ motivation for overselling their methods and forecasts is required. Recall that influence-seeking forecasters seem to oversell to maintain their credibility and the professional deference others afford them. This understanding does not predict overselling for the complacent. Over half of the complacent modelers, however, do indeed fail to acknowledge the uncertainty of their numbers. A reasonable explanation for these cases is that such behavior is merely a symptom of inattentiveness since no practitioner provides a convincing rationale to the contrary. The account that points most definitively at the inattentive conclusion claims no intention to mislead. “The uncertainty has not been discussed before because people have just been happy to have any kind of reasonable answer that uses responsible methods. I don’t think it’s been so much a matter of practitioners not disclosing the risks or uncertainty for reasons of self-interest as it is the underlying understanding that people want a simple answer.”

The inattentiveness characteristic of complacency may also allow bias to find its way into travel forecasts, especially when expediency takes priority. “What you end up doing is making up numbers using, quote, professional judgment.…But there’s a great deal of uncertainty about how accurate those numbers are and you usually end up saying, ‘Well, it’s not going to make a land’s worth of difference so I’m not going to lose any sleep over it.’” All three complacent modelers that are primarily motivated by material rewards confess to producing inferior analyses at times when resources are lacking, which does not contradict the intuitively obvious. In contrast, only one complacent modeler who is inspired by the technical challenge of forecasting acknowledged being party to sub-par work. There is no clear explanation for this apparent outlier, except that he represents the only consultant in the technical subgroup (the other three
consultants wholly comprise the material rewards subgroup). Perhaps even when concern for profits and losses requires compromises, as is sometimes (often?) the case in consultancies, they are such that they do not overshadow the intrinsic enjoyment of the task for those so motivated.

Finally, the technically-inspired complacent modelers do not, overall, describe ways in which they directly introduce bias into their work. This is consistent with expectations because they, like the relevance-seeking, experience few, if any, challenges to their autonomy. Remarkably, the three reward-driven modelers, who likely experience pressure to produce particular numbers do not report biasing their results. This is difficult to explain. Perhaps the best one can do is note that those with little to justify their actions beyond material rewards might be reticent to describe all that they do to achieve their desired goals.

5 Is it venality?

Overall, the data provide very little to suggest that modelers as a group are corrupt. The actions of only one modeler seem to approach the definition of corruption—*deliberate* and dishonest exploitation of power for personal gain. Although some of his words were previously presented, they merit repeating here for further consideration. “I knew what my board wanted and I had the model over there telling me, ‘Hey, I can’t give you the numbers that are going to be that good.’ Well, I’ve had to close the door of my office and go in and totally fabricate numbers…. I had a rationale for doing it.” Although his comments may seem damning, this particular modeler neither admitted to nor denied wrongdoing, nor could he articulate the rationale to which he alludes. The actions of other suspect modelers are equally inconclusive because they lack clear cases of misconduct or any acknowledgement of inappropriate activity.

In addition, if corruption is common in the field, conceivably some modellers, at least, should be able to provide details of wrongdoing by fellow practitioners. Instead, only a few professed knowing of corrupt activity and even then the information was second-hand and included few particulars.

It is, of course, conceivable that dishonest professionals are the least likely to come forward because if reflects poorly on them as individuals. To some, this might seem self-evident even though there is little in terms of hard evidence to support such a contention. However, is it also, if not equally, plausible that corrupt modelers might be more likely to discuss their wrongdoing with researchers because they either (a) believe their contribution might lead to structural changes that will make it easier for them to practice honestly or (b) want to provide a voice to engender some type of public understanding. Richmond [2], it seems, did not have to go to extraordinary lengths to find a confessing modeller, albeit one with ready excuses for his misdeeds.

5.1 Evasion

It would be easy to describe the fifteen cases of role circumscribing in this study as merely symptoms of the positivist orientations that modelers revealed. The
answer, however, may be more complex. Modelers may actually deceive themselves into accepting or retaining positivism as a way to avoid unpleasant realities. One who ignores evidence for \( p \), fails to seek evidence for \( p \) as faithfully as s/he pursues evidence for not \( p \), or selectively focuses attention on evidence for not \( p \), is evading. This process can lead to self-deception by pushing the belief in \( p \) beyond awareness. Ostensibly, the \( p \) for disillusioned modelers who display a predilection for circumscribing their role is the upsetting reality that they are marginalized and bear responsibility for the misuse of their work. Evasion, in these cases, serves as a coping mechanism where the primary goal is to preserve self-esteem. After all, if one wishes to be more relevant and have greater impact on policy, as the disillusioned do, it is counterproductive to introduce greater separation from the planning decisions one hopes to influence.

Should this theory be accurate, the belief that the complacent who circumscribe role push beyond awareness is likely to be they have no obligations to others that extend beyond providing methodologically sound forecasts. There are subtle signs that self-deceptive evasion may be at work in this way. One complacent consultant rejected out-of-hand a suggestion that he may have a responsibility for ensuring that the modeling caveats he provides to clients find their way into the hands of the public. “It not my responsibility to solve all the world’s problems,” he said. This sounds more like an attempt not to think about difficult questions than a reasoned profession of dogma. Because the symptom of role circumscribing does not change with the added complexity of self-deception, the data do not provide the evidence necessary to confirm this theory. There is, however, nothing apparent to invalidate it and therefore it should be tested more directly in follow-on research.

There are other beliefs in which forecasters of every type seem to place unquestioning faith. These are unsupported by both professor and the body of knowledge assembled over the years by others. As such, these seem to signal that even more in this sample depend on evasion to avoid other disquieting realities. Each cherished belief can be interpreted as providing, through evasion, either a way to cope or a mechanism to distance oneself from the unwanted ethical complexities of practice.

Recognizing evasion, in many instances, required the interviewer to note acts of omission. The modeler, whose quotation opens this section on venality, provides the most striking example. When gently asked to reflect on the rightness or goodness of his questionable behavior, the forecaster very quickly took up another topic. He was not untrusting. Rather, he seems never to have thought about the moral implications of his actions and he clearly did not want to do so. Ostensibly, he pushed beyond his awareness the belief that what he did was wrong—presumably to preserve a belief that he is a good person. Similarly, four modelers shied away from the interviewer’s use of the term “ethical”. Two reframed his questions to describe “good” or “best” practice, ostensibly to avoid consideration of their actions as potentially wrong and/or bad. To the same end, the other respondents simply pushed away the ethical characterization. One did so quite casually. “I assume that you felt it wasn’t ethical for the consultant to do that?” “Heh, heh,” the analyst replied. “Not so much ethical
as…[un]needed.” In a later interview, a metropolitan planning organization staffer was more direct when asked comparable questions. “Is that an ethical questions? Does it have an ethical dimension to it?” She replied, “I don’t want to respond [to that] in the area of ethics.” In contrast, other modelers subject to the evasive judgment ultimately confess to not considering important questions, yet they too are unable or unwilling to go beyond these acknowledgements. “What would have happened if we’d gone out and make a big stink about the alignment of one line? It may have caused such a brew-ha that the thing would have been derailed. It’s a tough ethical issue. I don’t recall thinking about it at the time.”

5.2 Excuse making

In addition to evasion, modelers in this study relied on a number of excuse making strategies to rationalize their ethically questionable behavior. Like evasion, this form of self-deception also resolves the conflict between beliefs that one is responsible for a negative outcome and one is a good person. The complacency of modelers is perhaps no place more evident than in the excuses that aim to underestimate the harm of an action. Six forecasters explained away their inattention to potential bias and misuse by contending that these do not really matter. Consider, for instance, the following. “The responsible way to forecast traffic for that project…is to go in there and use this [one particular] model. Go in there and update it. Carve some of that stuff out of the local comprehensive plan. You go and micro-calibrate a model to get what you really want. That would be the responsible way of doing that. I’m probably not going to do that. The project is already developed and I think the design is probably going to be whatever it’s going to be anyway. I don’t have time.” This modeler, too, does not believe it is worthwhile to be vigilant. “If you hear [your work misrepresented], do you have a responsibility to step in and say, ‘Wait a second!?’” “There have probably been times when we haven’t done that, but I think that is our responsibility. We should step in and tell them they are misrepresenting it.” “…Why is it that you don’t bother to correct things that are in there?” “It is not going to change anything.” In both examples, the forecasters use excuses to lessen the negativity of their questionable acts, which, while perhaps making them feel better about themselves, work to turn their attention away from questions of bias and misuse.

It is difficult to know with a great deal of certainty whether these and other excuses are sincere (i.e., does the individual truly believe them) or merely statements of convenience to justify one’s actions. The only apparent hint that the transcripts provide is the response of one modeler that suggests he may recognize his self-deception. “[Do you] lose any sleep over [overselling the numbers]?” “If I thought that [what] I was doing had any major impact on anything, I might. [laughter] Maybe that’s why I’m telling myself it isn’t important.” Whatever the case, sweeping self-assessments of influence are likely never to be correct. Policy outcomes by which these and just about every modeler in this study judges his or her impact are merely a product of decision-making processes, which represent only a subset of potential ways technical
analysis can have influence. The only answers available to the inquisitive here are self-deception or dishonesty. There is simply no sound basis for claiming that the modelers are right.

There are further reasons to believe that the excuses of modelers are self-deceptive. Three forecasters, one of each archetype, identify rationalization as a fixture of practice. Two talk of others and do not claim such behaviour for themselves. “All human beings rationalize. I haven’t seen a human being who doesn’t rationalize their behaviour. They don’t say, ‘I am evil.’” The second illustrates her point by imagining what a criminal might say to himself. “I think the guy who robs the bank probably has some way to justify [it] to himself. ‘Well, I really need that money and those people don’t.’” The third individual, however, does place himself in the picture. This modeller describes creatively re-evaluating his forecast to keep a project moving ahead. He does so, in his words, “to feel that I haven’t wasted my time for three months.” At the end of his account, he confides, “I can rationalize to myself that I’m doing the right thing.”

The most common excuse that modelers seem to employ relates to task difficulty and reflects the aforementioned problem of having insufficient resources to produce reasonably precise forecasts. As one might expect, the engaged forecasters as a group failed to rely on excuses. The distribution of excuses among the other two archetypes reflects no established pattern, which very well may indicate that self-deceptive excuse making can serve a coping role as well as a distancing one.

6 Conclusion

The stories and accounts of practice by the modellers who participated in this study were invaluable for challenging conventional wisdom about travel demand forecasters and the use of technical data in planning. If the forecasters assembled for this research are representative of the profession at large, the problem of biased forecasting has little to do with venality and ambition. Rather, it relates to unmet expectations and hidden opportunities to work constructively in alternate decision-making environments. Beyond indications that modelers are not corrupt, the findings should serve as a source of hope and pride for those concerned with the transportation planning profession. Indeed, some modellers are thoughtful, self-reflective and sometimes engaged in meaningful practice. Above all else, their stories are inspirational and provide the normative direction for correcting that which ails us.

References