Daniel Kahneman and Amos Tversky. “Prospect Theory: An Analysis of Decision under Risk” (1979)

In order to fully understand this literature, you must be familiar with prospect theory. You may already be aware of it, but just in case here is a brief overview.

Prospect theory states that individuals set a reference point, and that establishes whether they are gaining or losing. As the graph shows losses feel worse than gains (but both sort of peter out eventually). When we are in the realm of losses, then more losses don’t sting as much but gains make us feel much better; thus, we are willing to take risks to achieve gains. Similarly, if we are in the realm of gains then risk is unappetizing as it feels much worse to lose than gain.

In the figure below the X axis is monetary or measured losses or gains, and the y axis is utility.

![A close up of a map

Description automatically generated]()

Paper Summaries:

Greve 1998. Performance, Aspirations, and Risky Organizational Change. Administrative Science Quarterly, Vol. 43, No. 1 (Mar., 1998), pp. 58-86

Examines relationship between performance and organizational aspiration with regards to the hazard of change.

**Theory**

Paper roots itself on psychological processes regarding risk and aspirations (a la Kahneman and Tversky, 1979). Focuses on idea of aspirational reference point ( look up Kahneman and Tversky graph if you are not aware).

Aspiration levels are relative, either with respect to peers(social) or past performance.

Predicts that organizations change when they fail to reach an aspirational level. They can change multiple aspects, including their market position/niche.

**Empirics**

Study of Radio Broadcasting market. Radio broadcasting id defined by heterogeneous audience tastes. Radio broadcasters have many decisions to make (advertisements, music genres played, radio announcer style, etc.) there are 30 pre-defined radio formats (e.g. Soft Adult Contemporary, New Age, Urban Contemporary, and Soft Urban Contemporary, etc.) with many variations within. Changing a format is costly as many other attributes may also be changed (advertiser contracts, staff, etc.) and market research may have to be done. Radio stations care about measures of their audience, which is directly tied to advertising revenue.

4 different DV’s: Entry into an *innovative* radio format (high risk); entry into the *satellite* format; *production* change (e.g. change in methods of production) without a format change; *new* format or a change in format not into satellite nor an innovative format.

Here *social aspiration level* is defined as the mean broadcast share of all stations within a given local marker.

*Historic aspiration level* is defined as a weighted moving average of past performance.

Finds that behavior above and below aspirational level tends to be different. Huge drop in probability of change after you reach and surpass aspirational level.

A close up of a map

Description automatically generated

**Mapping to NK and Complex landscapes**

Here it seems that radio stations may engage in various jumps (long jumps are akin to changing format/genre, short ones to changing production (and arguably entering satellite format).

We can takeaway that change is less frequent when organizations perform well according to their aspiration level, and when it occurs less likely to a big jump (e.g. innovative format) if the organization perceives itself as doing well relative to its aspirations.

**Greve 2003: A Behavioral Theory of R&D Expenditures and Innovations: Evidence from Shipbuilding. The Academy of Management Journal, Vol. 46, No. 6 (Dec., 2003), pp. 685-702**

Engages with Behavioral Theory of the Firm to predict search and decision making with regards to innovation. This piece is related to his 1998 piece on aspiration levels and March (1963 and 1994). Really this paper is not innovative given his 1998 piece.

**Theory:**

He provides a very nice graph, reproduced below. Here he adds nuance to the aspiration level by noting it is “the smallest outcome that would be deemed satisfactory by the decision maker” (Schneider 1992).

Problemistic search is search for solutions to a specific problem. Poor performance induces search to solve apparent problems.

Slack Search is search for "innovations that would not be approved in the face of scarcity but have strong subunit support" (Cyert & March, 1963). It is engaging in the use of excess or slack resources (e.g. excess capital, financial resources, administrative resources, unused staff labor-time, etc.). High performance induces slack search as there now exists excess capacity to engage slack resources

Here we see poor performance induces both broader innovative “Search” because managers are more willing to take risks once they are in Kahneman and Tversky’s world of losses.

A close up of a piece of paper

Description automatically generated

Empirics:

Japanese shipbuilding industry (38% of global shipbuilding market in 2000). Examines 11 large firms over 26 years.

Here problemistic search is emphasis on R&D, especially projects already nearing completion. Slack search is also defined as increased emphasis on R&D… (yes they are the same).

More formally the dependent variable is R&D expenditure divided by sales revenue. Another dependent variable is innovation launches (that is, firm reports of innovations in trade journals)

Measures of performance include return on assets, return on sales, and return on equity.

Absorbed Slack is measured as ratio of expenses (administrative, general, and sales) to revenue. Unabsorbed slack is ratio of very liquid assets to liabilities. Potential slack is ratio of debt to equity. These are intuitive as you have clearly absorbed slack if you are managing to spend it all, have not absorbed it if you have cash lying around, and could get more if you have little debt.

He finds results consistent with theory.

**Mapping to NK.**

This paper is not as useful for us, I don’t think as his 1998 which gave us a way to measure the magnitude of jumps. Rather here we learn that organizations also engage in search when times are good because they have the resources to explore (which does not map as neatly onto NK).

Andrew Caplin, Mark Dean and Daniel Martin, 2011. Search and Satisficing. he American Economic Review, Vol. 101, No. 7 (DECEMBER 2011), pp. 2899-2922

This one is an experiment. Mind you I think this is a bad paper

Builds off a satisficing model of utility (which is remarkably similar to that of aspirations), they conduct an experiment to see if people actually satisfice. I find this paper to have clearly been written by economists and that they seem overly attached to their view of satisficing – though one could say that the behavior of their subjects is entirely rational.

They have a *Choice Process Environment*; or an environment defined by observing the contemplation time of the subjects, and the sequential decisions they make (which the authors see as novel, akin to eye tracking technology).

As an aside we could easily study this in an NK online experiment, as experimental subjects have a clear incentive to finish an experiment early.

The experimental paradigm is below, over the course of many rounds, subjects select a payoff, which they may keep re-selecting until they hit submit or time runs out.

A screenshot of a cell phone

Description automatically generated

In experiment 1 subjects are tasked to make a choice.

For experiment 2 subjects are told at some random point in time (drawn from a beta distribution alpha=2, beta = 5, truncated at 120 seconds) their choice will be the actualized choice for the experiment corresponding to their monetary payoff in dollars. This incentivizes quickly updating and heading towards the global maxima.

In experiment 3 is similar to two, but object complexity (that is number of addition or subtraction operations) varied within an experiment.

Experiment 2 and 3 induce a decreasing payoff to search in that it is increasingly likely that your effort will be unrewarded (e.g. at time t=110 seconds you may potentially find a better option, but it is unlikely to be the realized payoff).

Experiment 4 has the choice task as in experiment 1 but under a time constraint of 120 seconds.

There results are in figure 4 below, where they show the behavior conditional by number of switches. They drew the “satisficing lines” onto the graphs based upon their own model of where they infer experimental subjects will stop.

Overall I don’t think they made a big contribution. They built a toy model of satisficing with math behind it. Really I think the behavior of subjects is consistent with an idea that they engage in search as long as the marginal value of search is higher(which decreases according to their paradigms in experiment 2 and 3) than marginal value of time spent searching. They however do not test this model.

Heck according to their paradigm everyone ought to making at least one decision immediately (but many don’t) since no matter what the first decision has a payoff>0.

**Takeaway for NK:**

This is a paper of search under time constrained decision making. Really, I am surprised this got published in a top economics journal. If anything, I think this paper should remind us to think about how people may actually behave and to model agents, rather than get attached to our own models of how they should behave.

A close up of a map

Description automatically generated

Lant 1992. ASPIRATION LEVEL ADAPTATION: AN EMPIRICAL EXPLORATION

This paper further explores aspirational goal setting and performance feedback. The authors motivate their paper in large part by setting up a comparison between aspirational goal setting vs rational expectations (think psychology vs economic model of human behavior. Under rational expectations, aspirations should not be sensitive to feedback.

They gather teams of MBA students as experimental subjects (described below) and observe their goal setting and performance over multiple periods of an experiment

The author finds evidence that aspirations change faster then changes in performance. They further find that actors are not rational – in fact all but 3 of the teams tested set aspirations higher than average performance. That is people are generelally over-optimistic.

However with time behavior more closely approximates rational expectations. In later time periods, people aren’t as sensitive to feedback.

The author finds suggestive evidence that people are really anchored by early performance.

Experimental Protocol

They use experiments of an MBA marketing game called Markstrat:

“A typical play *of Markstrat* consists of five teams, each representing the top management team of an organization, who compete with each other in a single industry for up to ten periods. The five competitors can produce and sell two types of consumer products— Sonites and Vodites. The teams are responsible for setting performance objectives and making strategic and resource allocation decisions which they believe will lead to the achievement of these goals [in terms of number of units of a brand sold]. Thus, this game offers the opportunity to observe teams of decision makers setting objectives, making strategic and resource allocation decisions, and receiving feedback, over several periods of time. The teams are also making a wide range of decisions in a complex environment.”

There are many moving variables in this game. And teams are presented with lots of information

Apparently it is really involved, it can take hours to complete the game.

Teams play 7 rounds of this game.

Take Away

The experiment is really interesting. It is certainly complex, but it seems kind of black boxy. In fact Market Strat is a proprietary technology sold to firms and business schools.

I am not so sure what we are learning from this behavior beyond the Greve papers. Aspirations matter and teams alter goals in response to feedback, and people are optimistic. Perhaps for thinking about an experiment we now may expect participants to be generally optimistic and aspire towards always improving their performance.

**Gaba and Joseph, 2013. Corporate Structure and Performance Feedback: Aspirations and Adaptation in M-Form Firms. Organization Science 24(4), pp. 1102–1119, © 2013 INFORMS**

**Theory** In this paper they examine how corporate structure affects a firm’s performance. They build off of Greve’s prior work on how performance below aspirations should drive problem-driven search.

Whereas past research considered the firm as a whole, here they consider differing responses at the corporate level vs the intra-firm or business unit level. They hypothesize that poor performance at the business unit level focuses on revenue enhancement and efficiency leading to an increase in the rate of new product development. Whereas corporate level poor performance reduces discretionary spending (what may be called slack resources) and disruptively reorganizes the organizations, and ensuingly the rate of new product releases decrease. There are various reasons for these differences in behavior: corporate managers (such as CEOs) are responsive to short term outcomes like share performance and have general knowledge and view the firm as consisting as portfolios of business units; whereas business unit managers generally have product and unit specific performance targets and more specific knowledge.

They also theorize that business units with more importance and experience are less likely to be affected by corporate actions.

**Empirics**: 6 Mobile device manufacturers from 2002-08.

Dependent variable is number of new phones introduced during a quarter in a year.

They define aspirational levels by a weighted moving average of past firm and unit performance (operating profit margin). Similarly social aspiration is the average of other firms’ performance.

They find support for their hypotheses. They also tried to examine if radical innovation become more or less likely – but the results with those models were not statistically significant.

**Takeaway**

I find it hard to say anything new or exciting came out of this with regards to our goals. Really this is another aspirations paper but taking into consideration corporate structure. It’s good at what it does though.

**Audia and Goncalo: A Study of Inventors in the Hard Disk Drive Industry Management Science 53(1), pp. 1–15, © 2007 INFORMS**

Theory: This paper unites psychological research on incremental vs divergent creativity with March’s and Greve’s work on exploration/exploitation and aspirations. It further applies exploration-exploitation to the individual level. In integrating the research streams they predict that successful people are more likely to generate new ideas, but the new ideas will be more incremental.

They build off of Levinthal and March’s work regarding that when you are successful you ought to exploit and when you are not you ought to explore and apply that idea to creativity. Psychological research (Duncker 1945; Lunchins 1942; Bartlett 1958; Bareby-Meyer et al. 2004) suggests people, upon experiencing success with a strategy, become narrowly focused on implementing that successful to new problems. Further more success encourages dependence on heuristics that generated the success.

They further predict that the negative relationship between success and generation of novel divergent ideas is attenuated by teams in that teams increase the thought diversity.

Empirics: They use patent data within the hard disk drive space to measure creativity. They utilize the categorization schema of the patent office to identify more creative ideas. They assume that ideas that fall into fewer categories are less creative.

They also consider new patent citations (not including self-citations) as a measure of impact or success of an idea.

Overall, they find support for their hypotheses. Successful inventors are both more likely to patent but less likely to patent in more categories/subclasses, suggesting that success breeds less creativity across domains.

Takeaway: This paper is interesting in that instead of considering success and search, they consider creativity. Personally, I find it interesting as it suggests that success in one domain reduces the propensity to span categories.

**Kacperczyk et al. 2015. Disentangling Risk and Change: Internal and External Social Comparison in the Mutual Fund Industry. Administrative Science Quarterly 2015, Vol. 60(2)228–262**

Theory:

This paper explores change as it relates to risk. It builds of off Kahneman and Tversky’s work in gains vs losses framework (prospect theory) and the aspirations literature discussed earlier.

They theorize that individuals will engage in risky behavior when subject to negative firm-internal social comparison. Whereas for external social comparison change but not risk will be made. That is when someone is performing poorly relative to peers at other firms, it is attributed as an organization level problem (and organizations engage in problemistic search). But someone performing poorly relative to intra-firm peers, they will be concerned (they could be fired!). This is important because individuals will react according to prospect theory when they believe they are below some benchmark point (or aspiration level). This leads to their key predictions when performance exceeds external social aspirations then less change is made; when performance exceeds internal social aspirations then less risk is taken.

Empirics: They study the mutual fund industry. Other researchers and their own interviews identified that social comparison is salient for fund managers. And this is a good industry to study too since fund performance is public knowledge. Within the industry there are multiple firms (e.. Vanguard, Fidelity, etc.) each with multiple funds so that there may be both internal and external social comparison for managers within given fund categories.

They operationalized Change as *fund* *turnover* (stock trading frequency), concentration change (*Herfindahl* *index* of stock ownership within a fund), and *load* *change* (change in fund’s sales fees paid by investors). Of these three measures, an increase in the Herfindahl index is correlated with risk.

They operationalized risk multiple ways. S*ystemic risk* measured by a firm’s market beta or how much a fund varies as the market varies (beta>1 indicates higher volatility). Non-systemic risk represents risk specific to individual securities orthogonal to market risk (rather than the entire portfolio). *Total Risk* is monthly volatility of a funds returns over the past year.

Risky Change is measured by tracking changes in portfolio composition towards what are considered “growth” stocks and small-cap stocks.

Overall they find support for their hypotheses (though they find risky change is most likely to be taken when there is negative internal social performance but positive external social performance).

Takeaway: This paper is interesting in that it further studies where aspiration levels are set, that said I am not sure where it fits into our NK work.

My Synthesis of readings.

I think Berk did a great job of providing us with papers. It is apparent that these empirical and experimental papers are drawing upon similar ideas of search that inspired the NK literature. However there seems to have been a clear divergence in these two streams from some of the earlier work done by Jim March. Some works do not seem too relevant though.

Here is where I see us. I think that there is a structural hole between the NK models and the empirical and experimental work. Whether this a hole whose bridging leads to good returns is not something I can say.

However I think you are right that an experimental route would be the appropriate one to go down. Furthermore I think it is good that we have developed an alternative NK model that as beneficial landscape properties, which should lead to more meaningful search behavior. I think this poses benefits as we can then differentiate this paper form the earlier NK-model work which seems to have died out (and we can relate that to the properties of the original NK landscape).

My main concern though is trying to frame a paper such that is a meaningful contribution and doesn’t rehash what has already been shown empirically.