Rats, Black Swans, and Personal Careers – an Investigation of "Go with the flow" and "Deviate from common behaviour" Strategies

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Submission to

International System Dynamics Conference 2010, Seoul

March 2010

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Abstract

The purpose of the paper is to provide a formal representation of the so-called "rat race", in which the major question is whether rats should go with the flow or deviate from common behaviour. With the help of a didactic system dynamics model, various concepts from business, investment, and personal career strategies can be explained and their quantitative requirements can be determined. In an eclectic fashion, the paper draws on many scientific concepts, of which some have become widely known lately because of popular books in their fields. One finding of the simulation analyses is that—while behaviour following rational choice theory might be useful if decisions can be made without dependencies on other agents, leading to a norm-behaviour for an agent—deviating from the norm is beneficial when many agents in a system are coupled by a common resource. Furthermore, with many coupled agents, total system resources are more fully exploited when not all agents are rational. The value of the paper lies in its attempt to link different content areas with the help of a dynamic model.

Keywords: rat race, black swan, norms, differentiation, strategy

"The trouble with the rat race is that even if you win, you're still a rat"

Lily Tomlin, actress

1. Introduction: The rat race

The inspiration for this paper stems from Gigerenzer (2007, 76). In a nutshell, he explains that what might make sense under certain environmental conditions, does not necessarily make sense under other conditions. His main point is that the cognition of agents (encompassing their intelligence, heuristics available, and problem-solving competence) and their environment together determine the course (and usefulness) of behaviour (see also Simon 1990). With this idea, Gigerenzer connects to the structure-agency debate in the social sciences and—probably without knowing—to its feedback oriented understanding (Lane, 2001; Richardson, 1991).

Consider a rat that waits at the end of a T-shaped maze. On one side, left or right, will a piece of food been placed. So, the rat has to decide whether to go left or right. In 80% of the cases the food will be placed on the left side, in 20% of the cases the food will be placed on the right side. Where should the rat go if it does not know where the food has been placed (but—maybe through a learning effect—knows that the left side is more likely than the right)? From a rational choice point of view, the answer is clear: go to the left because in most of the cases you will find food there. However, what one finds is that rats exhibit a behaviour that is called “probability matching” (Brunswick 1939, Gallistel 1990): sometimes rats go to the right even though they decrease their overall chances for success (from 80% with a rational choice strategy to 68% with a probability matching strategy).

While the story would end here if there were always one rat having to decide on whether to go left or right (with the trivial conclusion that rats are not rational), things become more interesting and complicated if we assume that more than one rat has to go at the same time. Then going right can be beneficial since the few rats going right can reap a bigger portion of the food and do not have to share it with many competitors. So, not being rational can ultimately be useful or, more precisely, what is useful changes depending on the environmental conditions (in terms of number of rats). Furthermore, if some rats go right they also secure that food being placed there is utilized and not spoilt because there is no rat. Thus, the overall utilization of system’s resources is increased compared to the situation when every rat follows an individually rational strategy.

Note that in daily language, the “rat race” is often restricted to the “go with the flow” situation, i.e. going to the left, where most rats go because the chances to find food there are higher. In this limited form of the rat race, it is all about being faster, stronger, better; the rat race as described by Gigerenzer offers another possibility: deviate from the mainstream and be innovative by going to the right.

The purpose of this paper is to provide a formal representation of the so-called “rat race”, in which the major question is whether rats should go with the flow or deviate from common behaviour. With the help of a “didactic” system dynamics model, various concepts from business, investment, and personal career strategies can be explained and their quantitative requirements can be determined. In an eclectic fashion, the paper draws on many scientific concepts, of which some have become widely known lately because of popular books in their fields (besides Gigerenzer [2007], see the literature referenced in sections 2 and 5).

The structure of this paper is as follows. In the next section, some background information from the strategy field is presented on the principle decision to go with the flow or to deviate from norm behaviour. The third section describes the didactic system dynamics model in greater detail. In section four, some results from simulation analyses are shown and discussed. In the section thereafter, simulation outcomes are put into relation to various concepts and ideas from business strategy, investments, and personal careers. The paper closes with a brief presentation of possible points for improvement and further research.

2. Background: Being similar and being different as fundamental (business) strategies

From a strategic point of view, the rat race is about the decision to go with the flow or to deviate from it. In other words, when should firms just do what everyone else does? When should they go for something new and different? To a certain degree this discussion is related to the ambidexterity hypothesis in organisational theory (March, 1991): firms can be in an exploitative and an exploratory mode, either exploiting existing (and usually well-known to everyone) procedures and resources or exploring new ways on how to do things (which might considerably deviate from what others do).

Another linkage to strategic management can be seen in Porter's (1980) discussion of generic business strategies. The basic industry wide strategies that he identifies are "differentiation" and "overall cost leadership". Following a differentiation strategy as such requires the deviation from what others do, trying to offer different/new/innovative products and services. A cost leadership strategy frequently requires to employ standard methods and procedures, which are well-tested and for which high economies of scale can be expected; thus, going with the flow (but, hopefully, be ahead of it).

The question inherent in the rat race concerning being similar or being different can also be linked to the popular management literature on the practice side and the success factor research on the academic side. Both are comparable in the respect that they implicitly concentrate on the "being similar" (but better, faster, bigger) side of the rat race. Popular management books and the underlying concepts are regularly basing the success of a company on a rather simple idea or a simple set of ideas. The arguments for the effectiveness of these ideas are often anecdotes or metaphorical descriptions. With their help are best practices identified and made ready for transfer to other companies. Examples are “Lean Production”, “the Living Organization” or “Total Quality Management” (Womack et al., 1990; De Geus, 1997; Goetsch and Davis, 2009). While I do not doubt that such concepts can be helpful and effective under certain conditions, I am critical against their general usage and even if only for the fact that they most probably miss their strategic effectiveness if everyone uses them.

Academic success factor research is often methodological more sound than such popular best practice approaches, employing generalisation techniques from statistics, for instance. However, it follows the same line of argumentation: bundles of factors are identified that seem to be responsible for the success of an organisation. While starting up as a descriptive approach (what has been the case in the past), naturally success factor research also has a prescriptive character, underlying the sometimes hidden assumption that what has worked in the past might also be good for the future. An example is the well-known PIMS program (Buzzell and Gale, 1987; cf. Mintzberg, 1994).

Thus, both popular business literature and success factor research implicitly argue for a “being similar” strategy or at least result in such a strategy. If all companies follow the best practice approaches from the popular books, if all companies try to compete on a certain set of success factors, they necessarily go with the flow. Since so many companies do the same thing, the only competitive leverage point is therefore to be somehow “better” in doing what everyone else does, which probably is an unsuccessful endeavour.

3. A system dynamics model of the rat race

A didactic system dynamics model is used to increase the understanding of the phenomenon and to provide a tool for quantitative analyses of the strategic implications. As a “didactic” system dynamics model I understand a model that is mainly used to explicate already existing knowledge and to provide a tool to educate people. So, generating new insights is as such not the primary goal of this modelling endeavour, since the model is more or less a mere formal representation of what is in the literature anyhow. However, at least partially such new insights are provided anyway since the model offers a way to conduct quantitative analyses of a formerly mainly verbal concept. The (simplified) stock-flow diagram of the model is depicted in Figure 1.

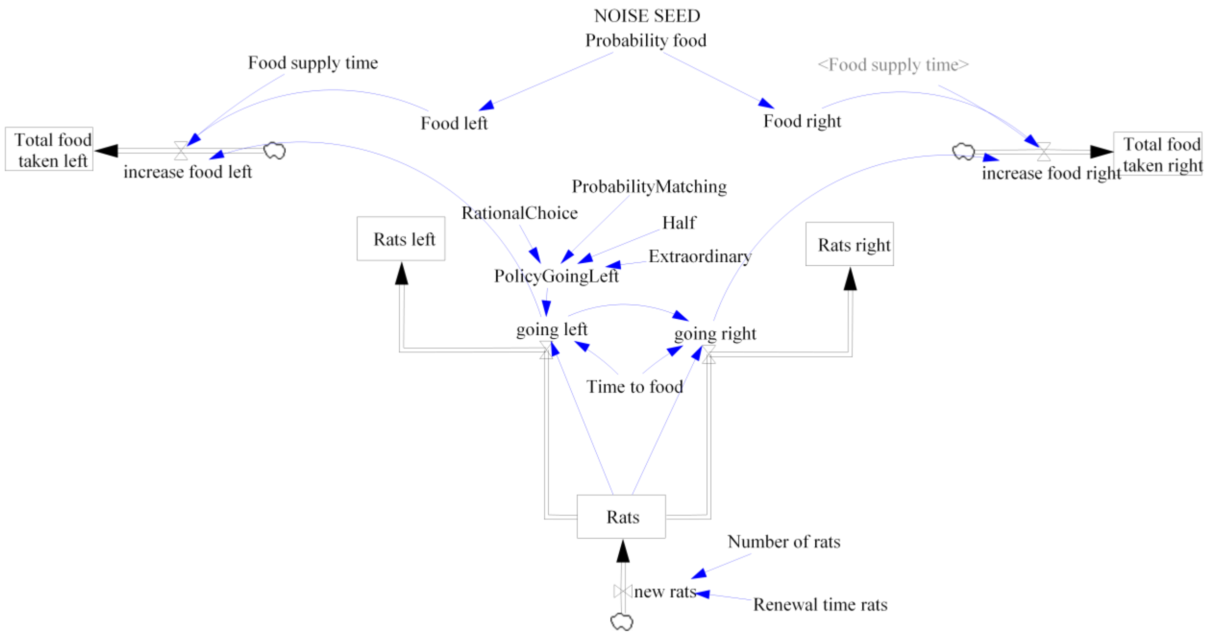

Figure 1: Simplified model structure for single rat model

The full equation listings for a single and a multi rat model (with 100 rats going at the same time) are provided as supplementary material. The principal mechanism of the models is easy to grasp: each hour one or more rats decide for either going to the left or to the right, depending on the policy they follow for making this decision. Accordingly, they end up either left or right and, depending on a probability function, find food or not. As in the original story by Gigerenzer (2007), food is located on the left in 80% of the cases and on the right in 20% of the cases. Then a new cohort of rats has to make the same decision; in total the simulation runs for 100 hours.[i]

As performance scores, four different measures will be used in the following simulation analyses (the indicator variables are not depicted in the stock-flow diagram in Figure 1):

- *Total food taken* as total system performance score: how much of the food distributed is taken by either one or more rats?
- *Average food* as an individual performance indicator: how much food do the rats get on average when they follow a certain policy for going left or right in the maze?
- *Difference averages* as an indicator which side's performance is better on an individual rat basis: where does the average rat get more food, on the left or on

the right hand side; if the number is positive, rats on the left hand side get more food; if the number is negative, rats on the right hand side get more food.

4. Results of preliminary simulation analyses

In this section a stepwise presentation of results can be found, starting with a single rat model, in which four different strategies for the rat to decide between going left or right are investigated. After that the discussion is extended to a multi rat model; in this model version one additional policy is studied besides the four policies from the single rat model.

Both versions of the model were developed in Vensim and make use of the random number generator for two purposes: first, in each round it is randomly determined if the food will be placed on the left or the right hand side; on average, chances are 80% for food left and 20% for food right. Second, some of the policies as further discussed below employ a random function to simulate the decision rules of the rats. In the current version of the paper, all simulation runs are based on the same sequence of random numbers. Since a relatively high number of simulation periods is investigated in each simulation run (100), general results are not deviating much from what can be expected from the theoretical characteristics of the distribution of, for instance, the left-right placement of food. Anyhow, in the final paper, the results will be extended using different random number sequences and employing sensitivity analyses.

In the single rat version, the model is discrete in the sense that the rat either goes left or right, no partial rats are studied. In these simulations, the following four policies are tested that determine whether the rat goes left or right:

1. *Rational choice*: the rat decides fully rationally, i.e. it always goes to the left (where it will find food in 80% of cases). Note that the rat needs information about the system: it must know that one side has a higher chance of having food—nevertheless, it does not need to know the exact probability distribution of left versus right, it just needs to know which side has a higher probability.
2. *Probability matching*: the rat decides in accordance with a probability matching behaviour, i.e. in its decisions it mimics the 80%-20% distribution between left and right; however, of course without knowing when the food is been placed on one side as opposed to the other. Here, the rat needs to have information about the actual probabilities of the two sides.

3. *HalfHalf*: the rat goes in half of the cases to the left and in half of the cases to the right. This strategy can be followed when the rat has no information at all about the distribution or expects an equal distribution between food on the left or on the right—however, in both cases the rat could as well just decide on one side (but for other reasons than in the *rational choice* case) or could randomly go left or right.
4. *Extraordinary*: the rat follows a *rational choice* strategy (thus, it needs to know that the left side has a higher chance of having food) but occasionally it deviates and goes to the right (in the simulation runs reported here, in 1% of the cases).

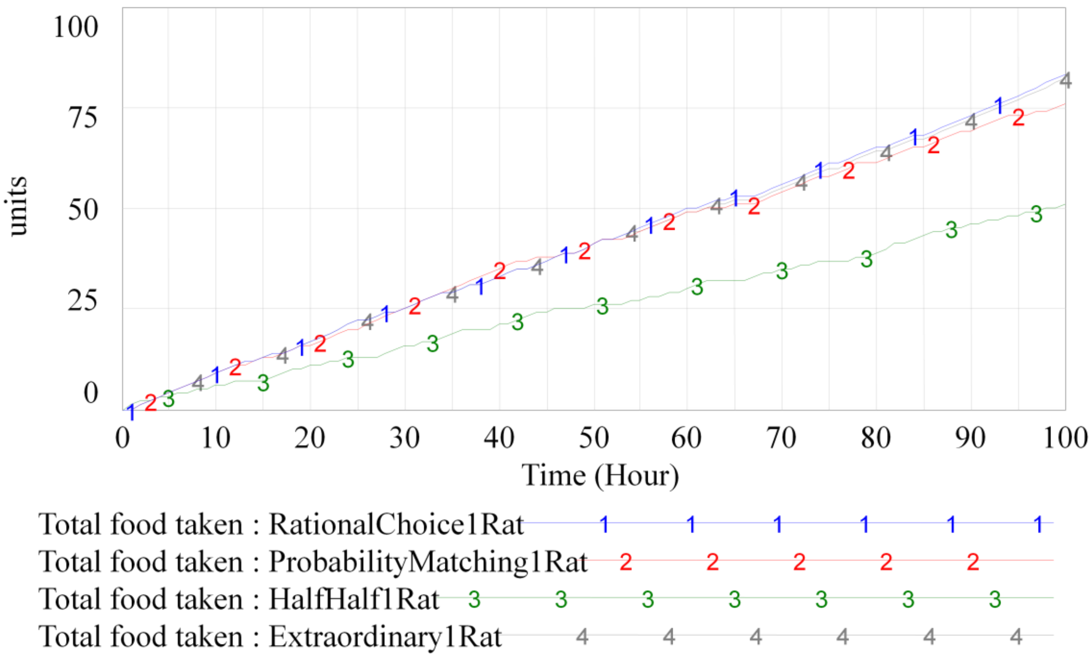

Figure 2: Total performance – single rat model

In Figure 2, the overall system performance (in terms of the food taken in total) for 100 simulation periods (equalling 100 rats) is shown. Although the detail results depend on the random number sequence employed in the simulation, the overall outcome is showing the theoretically expected behaviour. The *rational choice* policy scores best and also matches the theoretical result perfectly: food is found in 80% of the cases. The *extraordinary* policy scores only marginally worse, since obviously the few times the rat went right were not successful. Also with only a short difference, *probability matching* scores third. However, the result achieved in the simulation (finding food in 75% of cases) is significantly above the theoretical value of 68% (0.8 * 0.8 + 0.2 * 0.2)—an artefact of the random number sequence being used in this simulation. Obviously, the *halfhalf* policy scores worst, precisely ending up at its theoretical value of 50%. So, from a total system performance point of view (i.e.

maximising the food taken within the system), the *rational choice* policy is best. In the case of a single rat model, the individual and the overall performance outcomes identify the same policy as the best (rational choice) as can be seen in the following results and as can be derived from theoretical reasoning.

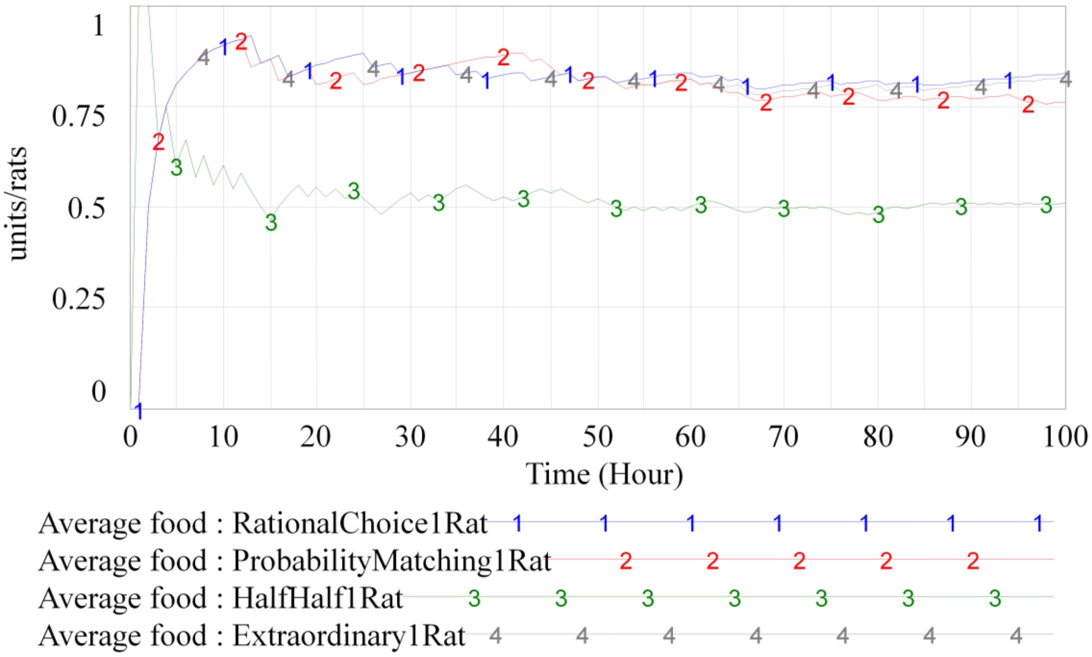

Figure 3: Comparison between policies – single rat model

The graph in Figure 3 depicts the individual performance of rats in terms of average food they find when following the four policies. *Rational choice* and *extraordinary* score best; both policies approach their theoretical value at or near to 0.8. *Probability matching*—as indicated already above—differs in a way from the theoretical value that it achieves better results than expected. For the *halfhalf* policy the theoretical value is exactly reached that says that rats find food in 50% of the cases (0.5 * 0.8 + 0.5 * 0.2).

Figure 4 shows the comparison between sides on an individual basis. In the figure can be seen that, no matter what policy each of the 100 rats follow, the rats going to the left are always better off. In accordance to the theoretical results, the *rational choice* policy again scores best. Only in the very beginning of the simulation run, rats following a *halfhalf* policy and going right achieved better results than those going left, since by chance food was placed right and the rat found it. The results for the *rational choice* and the *extraordinary* policy are virtually the same: (more or less) all rats go to the left and find food in 80% of the cases; from this value is the factor of rats going to the right (none) and the probability of finding food there subtracted (20%). Thus the simulation result approaches the theoretical value of 0.8.

Probability matching and *halfhalf* policies both have a theoretical value of 0.6 (0.8 average food on the left side minus 0.2 average food on the right side). However, the *halfhalf* policy approaches this value faster since more cases of a rat going to the right are included in the calculation.

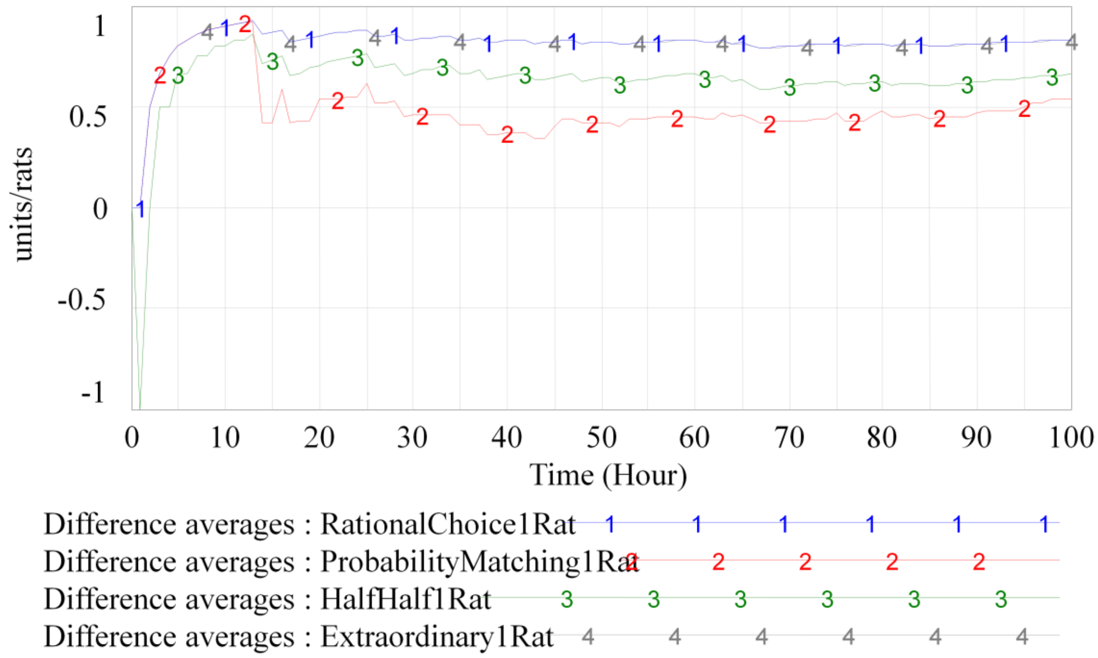

Figure 4: Comparison between sides – single rat model

While the results of the single rat model emphasise the dominance of the *rational choice* policy and are, thus, not surprising, things are getting more complicated and interesting when we switch to a multi rat model. Here, in each simulation period, 100 rats have to make a decision and not all rats need to go to the same side of the maze. Depending on the policy, with *rational choice* all 100 go to the left, with *probability matching* 80% go left and 20% go right, with *halfhalf* 50% go left and 50% go right, and with *extraordinary* 99% go left and 1% goes right. While the rats and their decision making process is considered to be continuous in this model version, the provision of food is still a discrete process, i.e. one unit of food is placed in each period on either of the two sides. Furthermore, a fifth policy is tested as a first approach to a feedback and learning oriented decision rule:

5. *Adaptation*: the rats base their decision on the average food they can expect on the left or on the right. If rats on the left have been better off in the past, a greater share of rats go to the left and vice versa. Note that this policy requires from the rats to have

information about historical individual performance regarding the two sides of the maze.

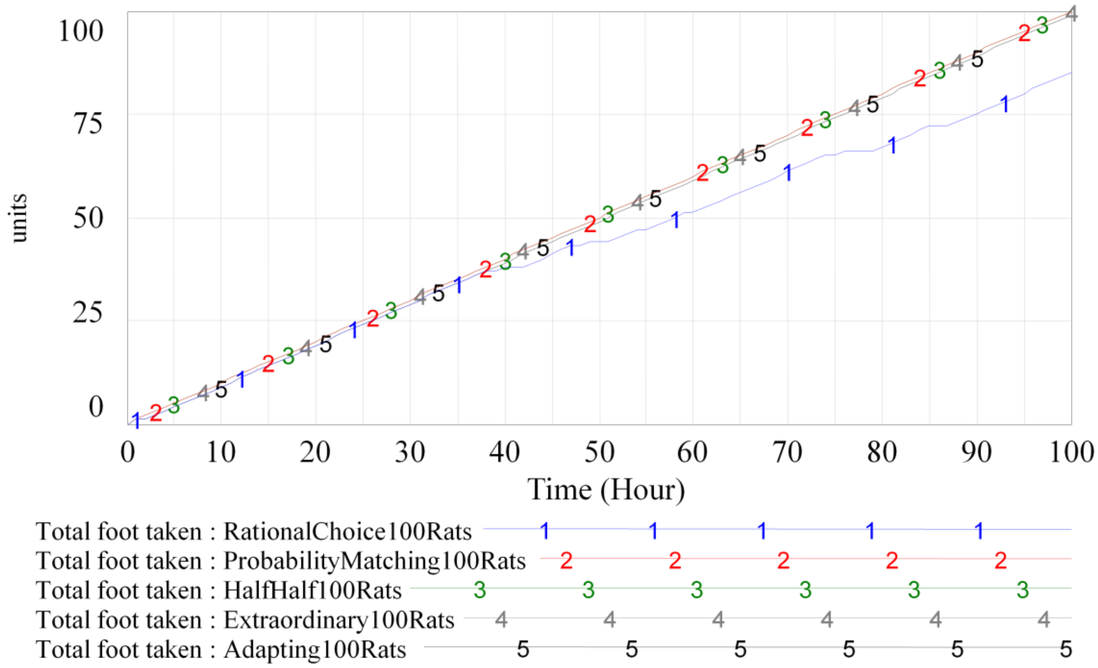

Figure 5: Total performance – multi rat model

Figure 5 shows the total performance in the multi rat model, in which still one unit of food is given per simulation period but now 100 rats compete for it; if more than one rat approaches the food, the food is shared amongst the number of rats finding it. As can be seen, the *rational choice* policy exhibits exactly the same total performance as in the single rat model: 80% of the food is taken, since all rats go to the left and, thus, get the food when it is there; however, food on the right side of the maze is always lost with this policy. This is different for the four other policies investigated: because with all of these policies at least one or a few rats are going right, also the food there is taken. Thus, (food) resources in the system are better utilized when not all rats follow a *rational choice* policy.

Simulation results for individual performance shows also clear differences to the single rat model. In terms of policy comparisons, in all cases but the rational choice policy, rats get on average 1/100 food units because all food is taken. In Figure 6 the difference in average food taken from rats on the left and rats on the right side is depicted (since more rats compete for one unit of food, the scale of the y-axis is different to Figure 3). For reasons of simpler presentation, Figure 6 does not contain the results for the *extraordinary* policy, which will be discussed in more detail later on.

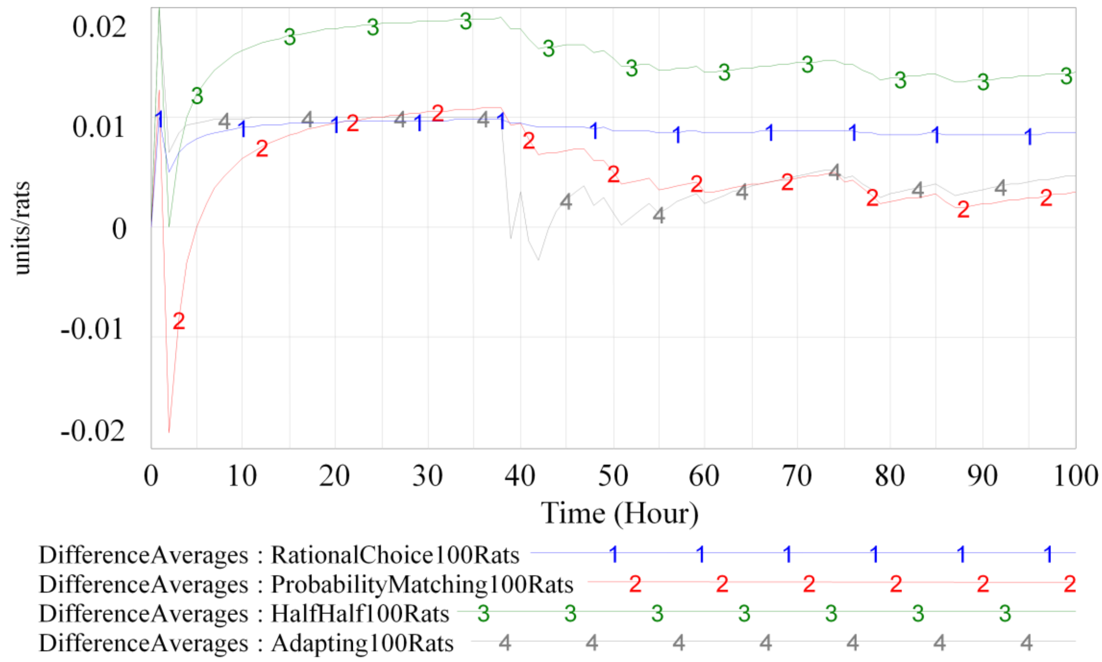

Figure 6: Comparison between sides – multi rat model (without the *extraordinary* policy)

One can see that it is now much less clear than before which side performs better, although still rats on the left hand side do a little better than rats on the right hand side (indicated by a positive value of the difference score). In particular for *probability matching* and *adaptation*, differences between the sides are marginal only. Indeed, analytically can be calculated that *probability matching* leads to an equal average of food for rats on the left and on the right.

The picture changes substantially when the *extraordinary* policy is included (see Figure 7). For this policy, going to the right side is definitely and by large the best alternative. The reason for this is that—although the small percentage of rats going to the right does not find food in the majority of cases—when they find food they do not have to share it with a lot of other rats (in the specific parameterization used for the extraordinary policy in the current simulation runs, exactly one rat goes right and, thus, it does not have to share the food unit at all).

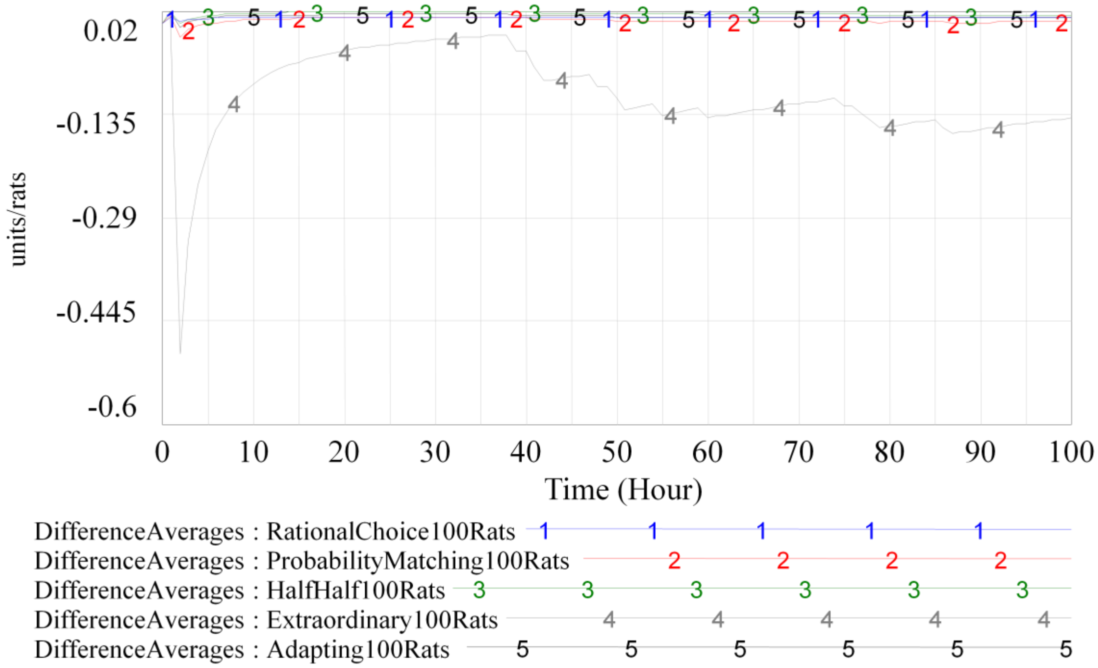

Figure 7: Comparison between sides – multi rat model including the *extraordinary* policy

5. Interpretation of simulation results in the context of business, investment, and personal career strategies

The preliminary results of the simulation runs using the didactic system dynamics model as described in section 4 can be interpreted in the context of various domains. In this section, I want to briefly make a connection to business strategy, investment strategy, personal career planning, and manufacturing strategy. Obviously, this section needs to be elaborated and enriched based on the results of the sensitivity analyses and other simulation runs to be undertaken for the final paper.

First, the results can be interpreted in terms of general business strategy, in accordance to the discussion in section 2 of this paper. The simulation runs indicate that usually going with the flow is the less risky alternative and—quite often—also the more beneficial option. However, there are exceptions: being one of the few that does something different and reaping the benefits for it, can lead to unparalleled success for the deviators. Since the “go with the flow” firms have to share potential profits with many competitors, their success is always limited in comparison to “being different” companies that are maybe the only ones deviating from the mainstream (i.e. offering a novel and innovative product or service). Three issues should be named here without further discussion in this version of the paper:

1. Companies “on the left hand side” (i.e. going with the flow) try to achieve outstanding positions by becoming more efficient as their competitors and—maybe ultimately—becoming monopolists.
2. Companies “on the right hand side” (i.e. deviating from the mainstream) have no guarantee for success and not even for survival—the interpretation of the results here is more that when there are a small number of deviators and they have success, this success can be rather substantial.
3. If companies that try something different become too successful it attracts new competitors, thus reducing potential benefits for the future (so, the left and the right side of the maze might interchange their meaning; this process is rudimentary represented in the *adaptation* policy as described above).

Second, the rat model can be interpreted as a guide to investment, in accordance to Taleb’s (2007) ideas of investing with consideration of what he calls “black swans”.[ii] In a nutshell, his investment strategy is as follows: invest most of your money in simple, risk free, low interest assets; however, invest a small share in high-risk, potentially high-yield assets. If you lose the latter one, it should be no existential loss, but if you succeed with it, profits are enormous. In terms of the rat race: go with the flow but do not try to outperform your competitors on the left hand side, just be sure to sustain your capital there—make your profit on the right hand side where you take considerable risk because you know the capital on the right is hedged by the security of the capital on the left.

Third, the rat model can be interpreted in terms of current developments in personal career planning (Werle, 2010). While it has become popular for nearly all of us to continuously work on the mitigation of our personal or professional weaknesses, we might be better off finding and putting forward our strengths since they are where we differ from the mass of people that are all somehow well-skilled and not having real, major weak spots. An example from learning English for non-native speakers might be helpful: beyond a certain degree of competence it does not make a substantial difference when you attend courses to become a bit more perfect—there will always be numerous people out there that have at least the same level of English competence. What could really provide a competitive advantage when applying for a job would be your (maybe even only basic) competence to understand a not so widely spoken language like Lithuanian.

Fourth, in operations strategy there is an ongoing discussion whether firms should focus on reducing any constraints they have or should concentrate on what are their world-class features or can somehow simultaneously improve on everything. Connected to this discussion are concepts like outsourcing, offshoring, performance frontiers, Theory of constraints, accumulative capabilities (cf. Morecroft, 1983; Goldrat, 1990; Porter, 1996; Ferdows and de Meyer, 1990; Skinner, 1974).

6. Outlook: Using the model in strategy education

The paper presented a didactic system dynamics model of the rat race. By means of simulation analyses, the effects of different strategies on the individual as well as on the total system performance were discussed and linkages to various fields of strategies were drawn.

Of course, there are many improvement points for the model and extensions to the simulation analyses:

- the simulation results can be compared more thoroughly to solutions of analytical calculations,
- more than one success criteria can be used to determine whether going left or right is more beneficial,
- sensitivity analyses can be employed to investigate the effect of different random number sequences or different parameterizations,
- other policies can be tested, e.g. with forecasting possibilities and learning taking place.

One important next step is the transformation of the model into a "management flight simulator", in order to better suit its educational purposes. From a research perspective, the model could also be the basis for experiments, investigating the characteristics of individuals choosing for one or the other way. Furthermore, the model-based research should be combined with field research, for instance surveying which route companies take in similar situations as in the rat race.

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Appendix

The full equation listing of the model is available online as supplementary material.

Notes

1 It could also be the same rats going for a new round, instead of new rats in each simulation period. Since no learning effects from experience are assumed in the policies analysed here (in contrast to Brunswick’s [1939] original experiment), there is no conceptual difference between these two understandings of the structure.

2 The metaphor “black swan” is often seen as a negative phenomenon but it just means a highly unlikely but nevertheless possible occurrence of an event.