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The theory of Rational Addiction

The Theory of Rational Addictions, *by Gary Becker & Kevin Murphy (1988), was a rational choice model that became a standard tool for economists modeling addictive behavior. The approach differs from other theories of addiction by modeling addictive behavior as the gradual implementation of a rational, forward-looking plan, where consumption at any point in time is partly motivated by the immediate payoff of consumption and partly by the effects this consumption has on the individual in the future. This makes addictive behavior a subset of rational behavior, requiring no more specific government policies or attention than any other consumption choice. Later work by economists extended the theory in different ways, allowing it to match an increasing number of consumption patterns, and searched for ways to test the forward-looking assumption in different types of market data. While the work was successful as a contribution to rational choice theory, with possible statistical applications, there are several reasons to dismiss its usefulness as an explanation of real-world addictive behavior and its ability to assess the welfare effects of addictions.*

INTRODUCTION

The Theory of Rational Addictions [1], by Gary Becker & Kevin Murphy (1988), is a curious piece of work. Gary Becker would later receive the Nobel memorial prize for Economics, and was already famous for applying rational choice theory to topics traditionally viewed as outside economics such as crime, family, education and discrimination.

Rational addiction (RA) was not his first attempt to model addiction, as heroin addiction had been briefly treated by himself and George Stigler, another Nobel laureate, in a work where they argued that economists should assume that preferences are 'stable over time and similar among people' [2]. Because behavior differs and changes, the economist should search 'often long and frustratingly, for the subtle forms that prices and incomes take in explaining differences among men and periods'. There was 'no other approach of remotely comparable generality and power [...] available', and the alternative was to drop 'the discussion as soon as the behavior of tastes becomes important', turning the problem over to 'whoever studies and explains tastes (psychologists? anthropologists? phrenologists? sociobiologists?)'.

In this early paper, the basic idea was that individuals have preferences over 'commodities' that are privately produced using time, effort, skills and market goods, etc. When people's tastes seemingly changed they were actually just investing in, adjusting or experiencing shocks to their production equipment. Applying this framework to heroin addiction, they argued that people dependent on heroin had an inelastic (i.e. price-insensitive) demand for euphoria and rationally increased their use of heroin to offset its reduced effectiveness in producing this good as tolerance to the drug increased.

When he returned to the topic of addiction, Becker had simplified his underlying framework. Whereas the earlier paper provided labels for the 'produced goods' for which people had stable tastes (e.g. musical appreciation, euphoria), he was now using an 'extended utility approach' where all goods, knowledge and activity were used to produce 'utility'. To use an analogy: if the earlier approach had said that a company bought labor, machinery and other goods to produce newspapers that it could sell to earn money, he was now skipping the description of the intermediate stages and saying that the company simply bought these things to make money.

WHAT IS A RATIONAL ADDICTION?

In Becker & Murphy's view, people can be addicted to 'alcohol, cocaine, and cigarettes, but also work, eating, music, television, their standard of living, other people, religion, and many other activities'. Unless an economic theory of addictive behavior could be developed, a broad set of human behavior would be left to other fields. 'Fortunately', they assure the reader, 'rational choice theory can explain a wide variety of addictive behavior'. This theme is struck again in their closing paragraph:

> Addiction is a major challenge to the theory of rational behavior [... but] a theory of rational addiction does explain well-known features of addictions and appears to have a richer set of additional implications about addictive behavior than other approaches. This is the challenge posed by our model of rational addiction.

At the heart of the theory is an assumption that rational individuals consider the delayed effects of addictive behaviors as well as their immediate rewards and risks. Negative addictions require a good or activity that both reduces one's baseline utility in the future (e.g. cigarettes today will provide nicotine withdrawal tomorrow), while simultaneously increasing the utility this good or activity will provide in the future (e.g. tomorrow's cigarette will now eliminate

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withdrawal in addition to its other benefits). The rational individual takes these effects into consideration and assesses whether a future life with cigarettes, alcohol, heroin or television is better than one without. If use is better than non-use, they gradually implement the forward-looking consumption plan that optimally balances the immediate and future costs and benefits of the behavior. This may involve gradual or rapid increases in consumption that appear to be 'getting hooked', but in reality the increase was planned and known already when they started using.

This forward-looking aspect is central, and emphasized by the authors as the key difference from earlier approaches that saw preference change as unexpected or due to different internal factions warring for control over an individual. 'By contrast', they write, 'in our model, both present and future behavior is part of a consistent maximizing plan'.

The rest of the paper is a mix of formal results from a mathematically specified model and creative re-interpretations of addictive phenomena. Negative life events, peer pressure or 'extraordinary stress while fighting in Vietnam' can have equivalent effects to past use, lowering one's baseline utility and increasing the utility-increasing effect of drugs (e.g. by helping you forget your sorrows in addition to getting you intoxicated). This means that such negative shocks are equivalent to a history of drug use, and can shift you into a situation where continued addictive behavior is optimal. As a result, even rational agents who are addicted will often be unhappy, although 'they would be even more unhappy if they were prevented from consuming the addictive goods'. Drug users trying repeatedly to quit are simply trying out different technologies for altering their tastes until they find one sufficiently cheap and effective to make quitting rational. Binges or consumption cycles are interpreted as 'the outcome of consistent maximization over time that recognizes the effects of current eating on both future weight and the desire to eat more in the future'; and so on.

WHAT WERE THE REACTIONS TO THE THEORY?

In my experience, people unfamiliar with rational addiction theory typically find it bizarre, and suspect that it was a minor oddity no one ever took seriously. In reality, as was often the case, Becker's work started a new literature in economics.

One part of the resulting work was theoretical. The rational agent's life-plan for future consumption of heroin, alcohol, food and television was derived from specific details of their consumption problem—the number of 'stocks' summarizing lagged effects, their depreciation rate, expectations regarding future tax or price changes, etc. By changing these, economists could derive optimal consumption plans that were 'rising, falling, shifting, cyclic, stable, stochastic, and chaotic, as well as endogenous quitting of both 'cold turkey' and 'gradual kind' [3]. Others extended the theory to allow for new interpretations of addiction. One paper dismissed the implication that people with addictions knowingly chose their addiction from day 1 by suggesting that only some people were at risk of lagged harms [4]. If rational people believe they are probably impervious to harms, they may find the risk of low-level use acceptable. They will only learn that they are wrong if they ever experience harms, but if this happens only after extensive use, their consumption technology may have changed sufficiently to make addictive consumption the best available option. As a result, they implement the new optimal plan and increase consumption to addictive levels. In another paper, these same authors even suggested that addicted drug users rationally take into account today how addictive goods in the future will make them care less about the future from then onwards [5]: a rational person, planning to use such drugs next year, would stop caring about later years immediately, judging the importance of the far future only through their future drug-influenced self's myopic eyes.

Although this work was theoretical, researchers would often draw policy conclusions from the work, typically arguing or implying that consumer sovereignty should be respected because addictive behavior was rational. This libertarian bent was typical of both Becker's work and the 'Chicago School' of economics to which he belonged, and flows naturally from the core assumption that all consumer behavior is rational. This assumption can be altered, however: if the drug-using rational agent suffers from choice biases [6] or temporarily overwhelming urges [7,8], the rational agent will try to optimally manage these issues. This may open for therapeutic regulation designed to assist the rational drug user in tempering over-consumption, avoiding temptation and reducing regret.

A second part of the literature was empirical, and the RA model was recently claimed to be 'one of the most influential, and of the most commonly empirically implemented, frameworks in health economics' [9]. Here, too, Becker was an early pioneer [10]. A key test of the theory was to determine whether the forward-looking rationality of rational agents could be discerned in drug use data. According to the theory, present and future consumption are part of a consistent plan, so if credible information indicates that there will be a heroin drought or tobacco tax increase next summer, a rational addicted drug user should adjust their consumption downwards immediately in response. Overall, the evidence from this line of research is viewed as mixed. The time preferences implied by the results vary substantially (and can take highly implausible values), and there appears to be a high risk of false positives when using aggregate data [11], as well as serious technical estimation and inference issues when using individual data [9].

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A third part of the literature took place outside economics, as philosophers and others tried to understand and evaluate the approach. Especially prominent was the work of Jon Elster. Commending Becker for 'sustained and probing' work on addiction that had 'raised the level of discussion enormously' by forcing others to sharpen and focus their own views on the nature of addictions [12], Elster wrote repeatedly about his problems with the approach, arguing, e.g. that the 'capital stocks' summarizing lagged effects involved inappropriate reasoning by analogy, that the very idea of endogenously chosen preferences/tastes was conceptually incoherent and that common attempts to pre-commit to quitting were a major empirical anomaly for the approach. To people less familiar with economics, however, both the theory and Elster's interest in it appeared odd. A book review in this journal wondered 'why so much intellectual firepower has been devoted to critiquing a narrow, highly technical argument made by two economists in an economics journal' [13]. Similarly, when two psychologists recently attempted to merge insights from a broad range of addiction theories, their summary of Becker concluded that it fails to predict realistic consumption patterns and 'calls to mind the old adage that economists prefer to be precisely wrong rather than vaguely right' [14]. Its 'most useful insight', they write, is that we should not necessarily take addicted drug users at their word when they say they would prefer to quit as soon as possible.

HOW SHOULD WE THINK ABOUT THE THEORY?

In many ways, RA models are a clear success—most obviously, in the sense of being published repeatedly in high-ranking economic journals; and secondly, by showing that optimal plans in rational choice problems with stable preferences and an unchanging environment can nonetheless involve changing consumption over time, which is an interesting theoretical point. Thirdly, the models have provided researchers with a flexible modeling framework that may be useful for describing behavior and its correlates, either statistically or by summarizing complex patterns of behavior in an 'as-if' story that human psychology can understand, recall and reason with. Such 'toy people' can be used as components in larger models, e.g. of markets, to determine what the aggregate implications of these behavioral patterns would be [15]. In a broader perspective, RA theory was also a useful corrective to researchers using even simpler models to declare that people whose behavior they did not understand were 'clearly' irrational.

While these successes are impressive in their own right, they do not involve the theory of rational addiction as a theory of addictions: a set of claims about why some people behave in a manner that we call addictive. This, however, has been an important part of the RA literature since Becker & Murphy first wrote that:

> …addictions, even strong ones, are usually rational in the sense of involving forward-looking maximization with stable preferences. Our claim is even stronger: a rational framework permits new insights into addictive behavior.

In line with this, as we have seen, they used their theory to explain why people behave in the way they do (e.g. they are not really unable to quit, they are not actually made unhappy by their own drug use), and to suggest that heavy addictive use of psychoactive substances is no more problematic from a welfare or societal standpoint than any other choice made by consumers. This willingness to apply the theory to the real world is shared with much of the later literature on rational addictions, which includes the claim that that 'harmful addictive behavior […] should no longer be considered a challenge to standard economic analysis. Rather, a remaining challenge is to employ standard economic analysis for further examination of the welfare implications of addictive consumption and provide better guidance for public policy design' [5].

In my view, such claims should not be taken seriously, even if many researchers seem to do so both in their published work and when asked directly [16]. They involve the use of RA models to support claims that RA models cannot support, claims regarding the actual causes underlying human behavior and claims regarding the welfare of real human beings [3,15,16].

One way to think about RA models is that economists have proved that Y is the optimal plan given a specific decision problem X, and have provided data suggesting that people may behave in ways that are qualitatively or even quantitively similar to Y. This, in itself, does not tell us anything about why real people behave as they do. To claim that your model explains their behaviour, you need to show that people behave like Y because they are facing or believe themselves to face choice problem X, and that they would behave differently if this were not the case. To claim that your model can assess the welfare of real addicts, you need to show that they actually face a decision problem sufficiently similar to X that Y is their optimal choice in reality, as well as theory. It is hard to see how this can be done, given that the decision problem X involves highly stylized, simplified assumptions that make analytic solutions feasible, with 'stocks' that neatly summarize lagged net effects operating through an unspecified mix of biological, psychological and social mechanisms converted to some unobserved common metric. At best, we can say that real humans with addictions are behaving 'as-if' they are implementing the optimal solution to an analytically simple decision problem we are quite certain they do not face.

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Against this, it may be countered that there must be something to the theory, given how well it fits a number of stylized facts about addiction and its (more mixed) support from empirical work. I think that this, too, is wrong. Recall the quote from the earlier Becker & Stigler paper on methodology where they implored economists to search 'often long and frustratingly, for the subtle forms that prices and incomes take in explaining differences among men and periods' [2]. This is equivalent to asking economists to search the entire space of formalized choice problems until they find a problem (a) whose optimal solution matches the thing they want to explain and (b) whose assumptions seem related to intuitions, anecdotes and stylized facts concerning the behavior at hand. Given the established flexibility of the extended utility framework and the often loose interpretations of the assumptions, any match between the optimal solution in the model and actual behavior in the real world involve a substantial amount of theoretical 'p-hacking'.

In closing, I should emphasize that my views on RA theory do not reflect a consensus among economists. The genre of RA models is still alive: my critical arguments are not, as far as I know, accepted or even known by many in the field.[1] During my PhD I was told that my first paper on Becker [17], 'from the perspective of an economist, might give the impression of an outsider that does not really understand the way economists think about these topics'. From the perspective of Becker himself, however, the same paper gave a better impression. Dropping his anonymity as a referee, he sent a signed letter calling it an 'excellent' work by someone who 'definitely understands the issues and analysis, and can distinguish relevant from irrelevant criticisms'. This obviously does not mean that he agreed with my arguments, but at least I made sense to the undisputed king of rational choice himself.

Declaration of interests

None.

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[1]The only exception was the time that I made an animated satirical video where a young bear justified her heroin use to her father using rational addiction theory, countering his arguments using the defensive responses that economists—in my view—often employed. The video was highlighted in a couple of popular economics blogs and remains available on YouTube as 'The Rational Addict'.

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