

IX Addiction I

1. FEATURES OF ADDICTION

Should it be limited to certain drugs, or to any behaviour that can exhibit broadly addictive tendencies? Certainly there is good evidence that dopamine is involved, in both human beings and other animals, in response to the main addictive chemicals: alcohol, opiates, cannabis, nicotine, cocaine, amphetamines, caffeine, benzodiazepines, barbiturates, anesthetics (e.g. angel dust), some volatile solvents (glue, whiteout etc). The main exception is LSD and similar hallucinogens, which animals will not self-administer. (NB for humans only a small number will move from use to addiction: < 10% for most substances, with nicotine an exception. The same is probably true for rats, but it is hard to tell since they are typically offered no choice. But see Serge Ahmed's findings.) Different substances give rise to the same distinctive patterns in both humans and animals: steady low dose for opiates; binge and abstinence for stimulants like cocaine and amphetamines, and for alcohol; steady high dose for barbiturates. Evidence is less clear for behavioral addictions.

Standard features include:

1. Euphoria on consumption and dysphoria on absence of consumption (though contrast alcohol and cigarettes); primary euphoria (from the alcohol) or secondary (from the behavior that alcohol permits); primary dysphoria (from the lack of alcohol) or secondary dysphoria (from the realization of the damage that alcohol is doing). Note though that with habitual use, it appears that there can be strong motivation without pleasure (Berridge).
2. Tolerance: more is needed for same effect (often very rapid, e.g. in one drinking bout)
3. Withdrawal
4. Craving
5. Crowding out (three aspects: this thing, for me, now; is this the same as craving?)
6. Cue and context dependence (Shepard Siegel's rats' mortality rates: 96% for unhabituated; 64% for habituated in unfamiliar surroundings; 32% for habituated in familiar surroundings)
7. Desire to quit and inability to do so (this is heavily belief and society dependent)
8. Relapse

DOES ADDICTION INVOLVE CHOICE?

Distinguish:

- (a) choosing to start on behaviour that will become addictive;
- (b) choosing to keep going once addiction has occurred;
- (c) choosing to become addicted

Distinguish too between rational and irrational choices.

NO CHOICE MODELS

Implausible for (a). Very plausible for (c). Real debate concerns (b). Seems plausible. But against it: (i) therapeutic benefits of insisting on abstinence (does this entail it's true?); (ii) the effects of higher taxes etc. (e.g. Denmark 1918, taxes raised on akvavit increasing retail price by 1200%; per capita annual consumption dropped from 5.1 liters to 1.1 liters; alcohol related mortality rates declined steeply); (iii) from longitudinal studies of the whole population (not just those in treatment) it seems that most people (>90%) do voluntarily give up addictions, typically by their early 30s, without treatment; (iv) strong incentives (eg on airline pilots, physicians) result in around 95% giving up.

RATIONAL CHOICE MODELS

Becker and Murphy:

Two properties:

P1: past consumption lowers the utility gained from a given level of consumption (cf. tolerance)

P2: past consumption raises the marginal utility of increased consumption (cf. withdrawal)

Given these conditions are met, an agent with a steep discount curve can rationally get themselves into a situation in which they consume something that reduces their average utility below the level they would have had without consuming, and then go on consuming it. (This is the phenomenon that Yaffe describes.) Should this count as addiction? Not obviously. The person doesn't want to quit; if they stopped consuming they would rationally start again; and in so far as they regret starting, this is just regret that they can no longer get the easy rewards that they got when they first started. (It is analogous to the regret that someone might have that they have spent all of their inheritance, thinking all the while that if they had it again they would spend it in just the same way.)

Alternatively, even someone whose discount curve is not so steep can rationally continue to consume a good with this property when some temporary stressful event causes them to first consume it (depending on the nastiness and duration of withdrawal). We will consider a much simplified version of Becker and Murphy's model, taking an example from Skog's paper 'Rationality, Irrationality and Addiction'. (Unlike Becker and Murphy, we assume only one choice—consume or not—and only one effective level of past consumption.) Suppose that the utility level from abstaining is 80 per period; that the utility level from consuming is 100 in the first period, followed by 70 in every subsequent period (tolerance); and that the utility level from ceasing to consume is 40 in the first period after cessation (withdrawal), returning thereafter to a steady rate of 80.

The agent with a discount rate of 0.6 will find it rational to start consumption if they have not consumed in the past, and will find it rational to continue consuming if they have consumed in the past (this is what Yaffe describes):

No prior consumption:

$$\text{Consume: } 100 + (0.6 \times 70) + (0.36 \times 70) \dots = 205$$

$$\text{Abstain: } 80 + (0.6 \times 80) + (0.36 \times 80) \dots = 200$$

Prior consumption

$$\text{Consume: } 70 + (0.6 \times 70) + (0.36 \times 70) \dots = 175$$

$$\text{Abstain: } 40 + (0.6 \times 80) + (0.36 \times 80) \dots = 160$$

In contrast the agent with a discount rate of 0.9 will find it rational not to start consuming, and rational to cease consumption if they have already started

No prior consumption:

$$\text{Consume: } 100 + (0.9 \times 70) + (0.81 \times 70) \dots = 730$$

$$\text{Abstain: } 80 + (0.9 \times 80) + (0.81 \times 80) \dots = 800$$

Prior consumption

$$\text{Consume: } 70 + (0.9 \times 70) + (0.81 \times 70) \dots = 700$$

$$\text{Abstain: } 40 + (0.9 \times 80) + (0.81 \times 80) \dots = 760$$

But someone with an intermediate discount rate of 0.7 will not find it rational to start consuming from scratch, but, if they find themselves already consuming, will find it rational to continue:

No prior consumption:

$$\text{Consume: } 100 + (0.7 \times 70) + (0.49 \times 70) \dots = 263.3$$

$$\text{Abstain: } 80 + (0.7 \times 80) + (0.49 \times 80) \dots = 266.7$$

Prior consumption

$$\text{Consume: } 70 + (0.7 \times 70) + (0.49 \times 70) \dots = 233.3$$

$$\text{Abstain: } 40 + (0.7 \times 80) + (0.49 \times 80) \dots = 226.7$$

This third case does look more like addiction: such a person would not restart consumption if they could stop it; and might genuinely wish they had never started, whilst still rationally continuing. This is the case on which Becker and Murphy focus.

Herrnstein and Prelec:

Rather than assuming steep discount curves, another possibility is that people underestimate their own likely tolerance and withdrawal. There is empirical evidence that they do. Given these false beliefs, otherwise rational agents can start consuming, and then find it rational to continue (the primrose path). Again they might have true regret: i.e. they might wish they had never started, and knowing what they now know, they might not start again if they could stop.

Lowenstein

Similar to Herrnstein and Prelec, but now the mistake is that agents underestimate the effects of craving on them. Again, ample evidence of this. Now though we have a split model: the idea is that agents can rationally start consuming; but the effect of initial consumption is to induce cravings, which makes them engage in irrational behavior.