

## X Addiction I

### 1. FEATURES OF ADDICTION

Should it be limited to certain drugs, or to any behaviour that can exhibit broadly addictive tendencies? Or to something in between? Certainly there is good evidence that dopamine is involved in most cases, although the way this works can vary (increased release; preventing it from being reabsorbed).

Standard features include:

1. Euphoria on consumption and dysphoria on lack 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 on the role of dopamine).
2. Tolerance: more is needed for same effect
3. Withdrawal
4. Craving
5. Crowding out
6. Cue and context dependence (Siegel's rats' mortality rates: 96%; 64%; 32%)
7. Desire to quit and inability to do so (this is heavily belief and society dependent)
8. Relapse

### DOES ADDICTION INVOLVE CHOICE?

Distinguish:

- choosing to start on behaviour that will become addictive;
- choosing to keep going once addiction has occurred;
- choosing to become addicted

Distinguish too between rational and irrational choices.

### NO CHOICE MODELS

Against this: 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).

## RATIONAL CHOICE MODELS

Becker and Murphy:

Two properties:

- PI: 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 which 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

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 ample 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.

#### IRRATIONAL CHOICE MODELS

Ainslie

Ainslie's model for addiction is the same as for weakness of will in general: hyperbolic discount curves. In so far as there is irrationality it is the irrationality of having such curves, with the resulting changing desires, and the subsequent vulnerability to cash pumping (i.e. to a series of trades each of which the agent will consent to at the time, which is guaranteed to leave them worse off by their own lights).