

# Analysis of Gambling Behavior

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Volume 1 | Issue 1

Article 4

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1-1-2007

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### Recommended Citation

Cooper, Andrew (2007) "COMMENTARY DELAY DISCOUNTING AND PROBLEM GAMBLING," *Analysis of Gambling Behavior*. Vol. 1 : Iss. 1 , Article 4.

Available at: <https://repository.stcloudstate.edu/agb/vol1/iss1/4>

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## COMMENTARY

### *DELAY DISCOUNTING AND PROBLEM GAMBLING*

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Weatherly and Dixon have provided a behavioural model of gambling that seeks to integrate findings from previous behavioural research and provide a testable framework for future behaviourally oriented gambling research. A strength of the model is that it incorporates a number of mechanisms that have not previously been well integrated in other (especially non-behavioural) models of gambling, namely the recent work on verbal, self-generated 'rules' and their influence on gambling-related contingencies. This integration echoes earlier calls for the greater assimilation of behavioural and cognitive accounts of problem gambling and should be seen as a positive development.

As the authors highlight, behavioural theories of gambling that simply focus on the contingencies of the game of chance itself are incomplete. Indeed, this had been a criticism of earlier behavioural theories. The rather nebulous term 'reinforcement history' used in the behavioural literature seems particularly unhelpful in the context of problem gambling. In their discussion of the advantages of their model, Weatherly and Dixon note the importance their model places on a presumed causal mechanism underlying problem gambling, in this case delay discounting. In their words,

'much of the proposed theory lies in the idea that how one discounts delayed rewards is a causal force behind pathological gambling'. While there are several studies that document a link between delay discounting and gambling behaviour, the evidence documenting this link is certainly less than unequivocal at this stage (see Reynolds, 2006, for a review). In particular, the link between delay discounting and moderate, but still problematic, levels of gambling seems unclear at this point (Holt, Green & Myerson, 2003).

More importantly perhaps, there is increasing awareness that impulsivity itself is multifaceted and that delay discounting may only be representative of one 'factor' of impulsivity. For example, Reynolds, Ortengren, Richards and de Wit (2006) examined the relationships between a range of self report and behavioural indices of impulsivity. A principal components analysis of the behavioural tasks found two components, labelled 'impulsive disinhibition' and 'impulsive decision-making', with a delay discounting task only loading on the latter component. More generally, it might be said that commonly used behavioural measures of impulsivity seem to differentially index both impulsivity related to motor control of relatively automatic behaviour and 'higher level' forms of impulsivity that have a substantial cognitive component. The relationship between problem gambling and both of these factors remains an open empirical question at this point. If a behavioural theory of gambling is going to posit causal mechanisms, then it will need to incor-

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porate more sophisticated models of the presumed underlying deficit in impulse control exhibited by problem gamblers.

More briefly, a further limitation of the proposed model is that it does not seek to incorporate different sub-groups of problem gamblers based on their preferred mode or form of gambling (e.g. electronic gaming machine versus sports gamblers). There has been increasing recognition of the heterogeneity of problem gamblers in terms of their usual mode of gambling and the differential pathways towards problem gambling that these sub-groups may have. Sub-groups of problem gamblers differing by primary mode of gambling may have substantially differing primary motivations for gambling (e.g. money, 'arousal', escape) that may have important implications for understanding their behaviour. Indeed, one recent cognitive-behavioural theory of gambling has explicitly modelled differences across primary forms of gambling (Sharpe, 2002). Weatherly and Dixon's model may ultimately need to incorporate something along similar lines.

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Action Editor: Simon Dymond