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# Remembering ‘Texas Hold’em Heads Up Poker’, the first skill-based electronic gaming machine

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Gambling formats can be categorized based on skill. ‘Skill-based’ formats, such as poker and horserace betting, yield situations where the gambler’s choice of bet meaningfully influences their long-run chances of winning. Some particularly skilled gamblers can therefore win money overall in skill-based gambling formats (Browne et al., 2015; Newall & Talberg, 2023). Electronic gaming machines (EGMs) are one of the most popular non-skill-based formats (The Economist, 2017), and are strongly associated with gambling-related harm (Allami et al., 2021), perhaps because all gamblers eventually lose money on EGMs (Turner et al., 2018). However, ‘skill-based’ EGMs (SGMs) are increasingly being introduced as a product which blurs this distinction between skill- and non-skill-based gambling formats (Delfabbro et al., 2020; Pickering et al., 2020). Many SGMs involve relatively small changes on the core multireel EGM game design (Livingstone et al., 2008), corresponding to bonus rounds based on some video game-like content, for example such as a game where gamblers burst bubbles in order to win bonus spins (The Drop, 2019). This letter is written to bring greater attention to the first SGM ever launched, which featured a more radical blurring of the distinction between skill-based gambling formats and EGMs.

‘Texas Hold’em Heads Up Poker’ (THHUP) was introduced to Las Vegas casinos in 2010, and allowed gamblers to play a computer at two-player limit hold ‘em poker, which is a real poker game played online and sometimes in casinos (Christenson, 2010). According to the advertising for this game, it was developed using neural net technologies (Turner, 2011). Despite the machine having variable response times to reflect its ‘thinking’, the machine’s strategy was entirely predetermined, and this was sold as a marketing feature, as the machine would not take advantage of weaker players’ mistakes (International Game Technology, 2009) suggesting that the use of ‘neural net’ in the advertising was more of a gimmick. Casinos usually profit from poker games by taking a percentage of each pot, which is called the ‘rake’. But THHUP charged no rake, and allowed gamblers to take any winnings earned against THHUP in full. How did THHUP’s developers expect to make a profit, then?

THHUP’s profitability was based on the computer’s skill at playing this poker game (International Game Technology, 2009). Any two-player poker game has at least one complete set of strategies that is in the long-run unbeatable, and will be able to profit from an opponent’s ‘mistakes’ as defined as deviations from this unbeatable strategy (Chen & Ankenman, 2006). THHUP’s developers were betting on their computer’s strategies being so close to unbeatable, that any potential losses to extremely-skilled players would be offset by THHUP’s wins against less-skilled players. This commercial model made THHUP a true skill-based gambling format, as considered by the gambling literature (Turner & Fritz, 2001). This was not an unwise bet, as another computer had in 2008 beaten a top team of professional players in this poker format (Newall, 2018), the use of computers as training aides by professionals was just about to begin

(Newall, 2013), and computers would soon beat top professionals at no-limit hold ‘em, a more complex poker game (Brown & Sandholm, 2017, 2019).

However, THHUP lasted only a few years in casino. Although it is hard to know how long the machine lasted without access to gambling industry data, there was little discussion of the machine later than 2013 on the online forum for poker players at [twoplustwo.com](http://twoplustwo.com) (see Note 1). It is possible that the machine was of little interest to amateur gamblers, given that no-limit hold ‘em is more popular than limit hold ‘em, which the machine plays. However, computers can now play no-limit hold ‘em better than top professionals can (Brown & Sandholm, 2017, 2019), and so if this was the reason for THHUP being discontinued, it would seem like a more popular version playing no-limit hold ‘em could be developed. Amateur players can also be suspicious when they lose, and the machine made many plays that appear unconventional to amateurs and yet have theoretical justification (Chen & Ankenman, 2006). It may well be that the machine was only of interest to top professionals, who could then exploit any mistakes that it made (see Note 2). One later SGM allowed gamblers to play the related game of six-player limit hold ‘em against computers, but its profitability was ensured by a high rake, rather than the skill level of its five computer opponents (Yakovenko, 2015). Most SGMs today therefore operationalize skill not in terms of its original gambling definition, but in terms of video game skill (Pickering et al., 2020). THHUP shows how SGMs might have evolved differently.

### **Declaration of conflict of interest**

Philip Newall is a member of the Advisory Board for Safer Gambling – an advisory group of the Gambling Commission in Great Britain, and in 2020 was a special advisor to the House of Lords Select Committee Enquiry on the Social and Economic Impact of the Gambling Industry. In the last three years Philip Newall has contributed to research projects funded by the Academic Forum for the Study of Gambling, Clean Up Gambling, Gambling Research Australia, NSW Responsible Gambling Fund, and the Victorian Responsible Gambling Foundation, received travel and accommodation funding from Alberta Gambling Research Institute, and received open access fee funding from Gambling Research Exchange Ontario.

**Note 1:** For example, this thread has numerous screenshots:

<https://forumserver.twoplustwo.com/29/news-views-gossip/quot-texas-hold-em-heads-up-poker-quot-ai-machines-ny-times-story-1369797/index2.html> (last post August 2014); and an extensive discussion can be read at <https://forumserver.twoplustwo.com/29/news-views-gossip/more-info-igt-heads-up-machine-1000083/> (last post December 2012).

**Note 2:** This post on twoplustwo.com is consistent with this interpretation <https://forumserver.twoplustwo.com/showpost.php?p=40083385&postcount=29>.

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