

# Langer's illusion of control and the cognitive model of disordered gambling

*E. J. Langer's paper, 'The illusion of control' (1975), showed that people act in ways that suggest they hold illusory beliefs in their ability to control the outcome of chance-determined games. This highly cited paper influenced the emerging field of gambling studies, and became a building block for cognitive approaches to problem gambling. Over time, this work has inspired therapeutic approaches based on cognitive restructuring, preventative programmes focused upon gambling myths and regulatory scrutiny of skill mechanics in modern gambling products. However, the psychological mechanisms underlying the 'illusion of control' remain elusive..*

## INTRODUCTION

Imagine you spontaneously decide to buy a lottery ticket. The clerk asks you if you would like the 'lucky dip' (or 'quick pick') option, where the lottery machine assigns you six numbers, or would you like a slip to choose the six numbers yourself? Now imagine you are running late for an important meeting on the other side of campus. You enter the elevator knowing that the 'door close' buttons have been disabled across campus. Do you click the button? If you are like most people, you select your own numbers in the first scenario and you hammer repeatedly on the button in the second scenario. You do so because people are highly motivated to perform irrelevant behaviours that offer no control over their desired outcome [1].

Langer [2] described a series of experiments using games of chance in which participants reported an 'expectancy of a personal success probability inappropriately higher than the objective probability would warrant' ([2], p. 311). In the most well-known of these experiments (study 2), Langer gave some office workers the opportunity to buy a lottery ticket for \$1, represented by cards with pictures of football players on them. Some participants ( $n = 27$ ) chose their lottery ticket from an array, while others ( $n = 26$ ) were given a ticket by the experimenter. The assigned tickets in the control group were 'yoked' to a participant from the choice condition. Just prior to the lottery draw, participants were given the opportunity to sell their ticket back to the experimenter, naming their price. The resale value set by participants

who chose their ticket was significantly higher (mean = \$8.67) than participants who were assigned their ticket (mean = \$1.96).

Study 6 added two twists to this procedure. Instead of a choice, participants were assigned to a high or low 'involvement' condition. Specifically, three lottery numbers were either revealed to the participant over successive days (high involvement), or in one go on the day of purchase (low involvement). Then, on the day of the draw, participants were offered the opportunity to exchange their ticket for a ticket in a different lottery—a lottery with an obviously higher chance of winning. The high involvement group were more confident that their ticket would be selected and were more likely to keep their original ticket (64 versus 32%).

Langer [2] argued that people experience an illusion of control in situations where their behaviour can exert no influence over the outcome. Over the six studies, Langer identified four factors that could instil this effect by creating what is often described as 'skill-chance confusion' [3]: choice, involvement, competition and familiarity. Subsequent research on the involvement factor has tended to operationalize it as an instrumental action, such as throwing a ball or dice [4,5]. One important consequence of the illusion of control is that participants may forgo a more favourable option, as seen in their refusal to switch to the lottery with the higher chance of winning in Langer's study 6. In a companion paper, Langer & Roth [6] noted that the sequence of outcomes, such as an early run of successes at a task (i.e. beginner's luck), could also affect perceptions of control.

Falling for the illusion of control has a range of clinical and subjective consequences, relevant for mental health and wellbeing. In patients with panic disorder, breathing air enriched with carbon dioxide can be powerfully anxiogenic, but presenting patients with a dial that they were told could reduce the carbon dioxide level significantly reduced their panic symptoms and subjective anxiety—even though the dial was ineffective [7]. Later work by Langer as well as others found that illusory beliefs of controllability improve wellbeing among many groups who are deprived of control in their lives; for example, due to physical illness, grief or old age [8–10]. Unsurprisingly, however, illusory beliefs can also have deleterious consequences [11]. Particularly when money is wagered on the outcome of games that are objectively uncontrollable and contain a 'house edge', the illusion of control may lead to persistent gambling and financial loss.

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## THE COGNITIVE MODEL OF GAMBLING

Langer's paper acknowledged Henslin's [12] earlier work that described superstitious behaviours among craps gamblers, such as blowing on dice and throwing the dice forcefully to hit high numbers. Langer [2] noted that factors driving illusory control could be introduced or enhanced in gambling products to increase revenue. Notably, Langer stopped short of making any links to harmful gambling, and her studies did not screen for gambling or include any groups of real-world gamblers. Indeed, the immediate clinical connection for her theory was to depression [13], evolving into the influential hypothesis of 'depressive realism' [14] (for a contemporary appraisal see [15]). The modern field of gambling studies was in its infancy at the time she published her seminal paper, but grew steadily following the clinical recognition of pathological gambling in ICD-9 (1978) and DSM-III (1980).

In looking to establish itself, the field of gambling studies took inspiration from cognitive research, of which Langer's work was a key example (see also [16,17]), alongside other insights, including Skinner's work on variable ratio schedules [18] and nascent findings in the field that later became known as judgement and decision-making (e.g. [19,20]). For instance, Robert Ladouceur and his team in Quebec, Canada began their ground-breaking programme of research on gambling with a series of experiments that struggled to replicate Langer's effects on confidence ratings and betting using simple coin-toss and dice-throwing tasks [21–23]. His team ([23], study 3) was also the first to study the illusion of control with a group of regular gamblers. Despite the a priori prediction that illusory beliefs should be elevated among gamblers, the findings remained inconclusive. However, during the debriefs for these experiments, Ladouceur's team noticed a range of misunderstandings among their participants which were much in line with an illusion of control [24]. To capture these cognitions during the act of gambling, Gaboury & Ladouceur [25] pivoted to a 'think-aloud' procedure where experienced gamblers were asked to verbalize their uncensored thoughts throughout a period of gambling. This study also marked a shift towards greater ecological validity in gambling research, reporting two experiments using an authentic slot machine housed in the laboratory (study 1) and a roulette game (study 2). The majority of verbalized cognitions during these sessions were classified as 'irrational' or 'erroneous', and many discrete statements indicated that the line between skill and chance was indeed blurry in the gambler's mind [26].

The 'think-aloud' findings became the foundation for the cognitive formulation of gambling, which argues that gamblers bet excessively because they inaccurately perceive the negative expectancy of gambling. Langer's illusion of control—together with the gambler's fallacy—are the two best-characterized sources of this misperception [27]. A key tenet of the cognitive account is that these erroneous thoughts are elevated in people with gambling problems. Following a decade of research using the think-aloud procedure, this hypothesis was confirmed with the development of several questionnaire measures for probing 'gambling-related cognitive distortions' [28–30]. Illusory control items feature heavily on these scales, and robust

associations are reported between illusory control beliefs and disordered gambling [31,32]. Other specific consequences of illusory control have been described since, including elevated craving to gamble and increased motivation in the face of gambling losses [33,34].

At a clinical level, cognitive distortions feature in broader theoretical frameworks that consider biopsychosocial factors in the development and maintenance of disordered gambling [35,36]. For example, the influential 'pathways model' incorporates cognitive distortions as part of the final common pathway to disordered gambling as a conduit connecting gambling accessibility to habit formation and loss chasing [35]. Because higher levels of cognitive distortions are associated with poorer outcomes [37], cognitive restructuring may be used to identify and modify the specific distortions to which a gambler falls prey, often within the context of cognitive behavioural therapy (CBT). CBT is regarded as the gold standard treatment for disordered gambling [38]. Although the 'think-aloud' technique is used by many CBT practitioners as a means of activating these cognitions [27], clinical trials that test cognitive restructuring as an isolated component remain equivocal [39,40]. Nonetheless, the emerging field of gambling prevention has also paid considerable attention to the goal of raising awareness of cognitive distortions and correcting misperceptions, including the illusion of control.

## POLICY AND PREVENTION

The concept of informed choice applied to gambling, similar to any consumer protection framework, requires that gamblers understand both the mathematics and the psychology of the products they are using [41]. Current programmes have two distinct flavours. One focuses upon the design of gambling educational programmes for youth such as could be delivered, for example, in a secondary school curriculum [42]. The other is directed at casual gamblers who are at risk of developing gambling problems in the future [41]. Many jurisdictions have invested in 'myth-busting' messaging, to be available at information booths in casinos, or as part of broader 'responsible gambling' programmes [43]. At the current time there are few trials evaluating the effectiveness of these tools and, indeed, limited evidence for efficacy. In a study that is representative of the wider literature, Williams & Connolly [44] found that an undergraduate statistics course that was modified to include content on the mathematics of gambling as well as problem gambling awareness improved performance on an end-of-term test, but this knowledge did not transfer to real-world gambling involvement or problem gambling symptoms. Analogous to the well-known 'dual-systems' framework, statistical training (of a 'cold' system 1) may do little to stop the gambler switching to hot system 2 when they encounter the exciting, visceral experience of being 'in the action' [45,46].

These programmes face a number of challenges, including the tendency of gamblers to compartmentalize such knowledge or the tendency of gamblers to 'zone out' during long slot-machine sessions, suggesting an absence of free will and personal responsibility [47]. For the illusion of control more specifically, one complication is

that different forms of gambling vary in the precise ways that skill may be expressed. In poker most clearly, but also blackjack and sports betting, the application of skill and knowledge affects the outcome. Gamblers who favour these forms are still seen to over-estimate their level of skill [26,48], as do stock traders [49], but such an effect is not categorically 'illusory'. Moreover, gamblers often study their preferred games intensively and develop sophisticated arguments to rationalize their control [50], such as strategies for making their funds last longer or to reduce the chance that a lottery jackpot would need to be split with other players.

Within chance-based gambling products, technologies are continually being added to provide gamblers with a heightened sense of control. One of the first devices introduced on slot machines was a 'stopper' button for braking the reels. The win or loss outcome on such a game is determined when the reel is spun, so any sense of control from using the stopper is illusory [51], yet many gamblers can attest to a compelling experience of self-agency following a win when applying the stopper. A second example is on contemporary multi-line slot machines, which allow the gambler to choose between a number of line and bet options. By playing more lines gamblers experience a more frequent rate of small wins, yet, counterintuitively, the number of lines played has no impact upon the overall rate of return [52]. These features peak in a new generation of 'skill-based' gambling machines that resemble traditional arcade games (e.g. a basketball game). With these new products, designers face a complex challenge of rewarding continued practice while protecting the operator's house edge [53]. At the current time it remains unclear whether these skill-based games will be successful from a business perspective, and how they will impact cognitive distortions and gambling harms [54]. As the digital environment advances at pace, it behooves gambling regulators to identify and restrict features of gambling products that are found to foster information asymmetries and increase gambling harm. Helpful in this regard will be a better understanding regarding why cognitive distortions can lead to excessive gambling.

## SEARCHING FOR MECHANISMS

If we return to Langer's classic scenario of exchanging a lottery ticket that you have picked: why do people refuse to exchange that ticket? Langer's description [2], in terms of 'personal success probability', implies an effect on probability judgement: when people choose their lottery ticket, they feel more likely to win. In subsequent research it became clear that other mechanisms, of a more emotional nature, may play a role. From an agency perspective, perhaps people assign more reward value to a desired outcome that arose from their own behaviour ('I made that happen!') [55,56]. Refusal to exchange one's ticket may be fuelled by an effect of ownership (the 'endowment effect') or sunk costs [57], as well as 'regret anticipation' [58,59], by which people forecast how awful they would feel if their chosen ticket ended up winning after exchanging it for another. These mechanisms are not mutually exclusive, and there is a range of support for each.

Humans are creative in the ways in which they infer control. One influential account distinguishes primary control and secondary control [60]. Primary control is when a person directly modifies their environment, such as choosing a lottery ticket. These are the factors that Langer focused upon. However, when primary control is unavailable humans appeal to secondary control: for example, they may interpret a losing streak as a signal that a win is due (predictive control), or they may interpret a win as a sign that their luck has changed and, hence, they should continue to bet. Both these examples also relate to other cognitive distortions that are widespread among gamblers and captured on questionnaires such as the gambling-related cognitions scale, but many of these effects can also be viewed from an overarching 'control' perspective, in which the gambler is looking to master or at least make sense of an unpredictable environment [60].

Although the cognitive account draws heavily upon erroneous thoughts, other accounts of illusory control rely upon behavioural principles from associative learning. People often face learning environments in which they must gauge whether their behaviours trigger a desired outcome (e.g. an evening at the casino, or the earlier example of the elevator 'door close' button). In these settings, high rates of responding and high rates of positive outcomes are seen to fuel 'illusory correlations' or exhibit 'superstitious conditioning' [14,61], and within this framework instructions that encouraged analytical thinking were effective at reducing the illusion of control [62] with relevance to the educational programmes discussed above. Using this kind of procedure, people with gambling problems were seen to over-estimate the effectiveness of a hypothetical new medication in treating an illness, witnessed during a series of observations [63]. The effect was striking because the procedure bore no resemblance to gambling, leading the authors to conclude that control biases in people with gambling problems are 'domain-general' tendencies.

A recent study by Klusowski *et al.* [64] revisits one of the key tenets in Langer [2]: does the simple act of choosing the ticket transform the odds of success in the mind of the ticket owner? In a paper that is also notable for its strong open science credentials, 17 pre-registered experiments are reported, with more than 10 000 participants in total. Experiments 1–9 randomized participants to choice and no-choice groups on tasks involving dice numbers or trays of identical-appearing chocolates that might be different flavours. The results were eerily reminiscent of the original Ladouceur studies [21,23]. When participant sampling does not select for gambling involvement and taking measures of confidence or risk-taking on trivial guessing tasks, the illusion of control was ethereal. In their later experiments, Klusowski *et al.* switched to a task where a prize was hidden in one of several boxes. Here, a minority of participants in the choice condition rated their chosen box as being more likely to win. Critically, by taking these ratings both before and after the choice (experiments 16 and 17), Klusowski *et al.* generate a major insight: the participant's choice is a behavioural artefact of a pre-existing belief that one of the boxes is more favourable than the rest.

The Klusowski *et al.* study convincingly shows that the sheer act of choosing changes very little; rather, participants choose options

that are in line with their beliefs. Some readers may gladly pounce upon the conclusion that another classic effect in psychology has bitten the dust, but does Klusowski's formulation of Langer have the outline of a straw man? When people buy lottery tickets, what kinds of numbers do they choose? They might choose their family members' birthdays because these are special numbers [65], or they avoid consecutive sequences [1-2-3-4-5-6] because they have a faulty belief that such sequences are less likely [66]. In both cases, it is their pre-existing beliefs that guide the choice, not vice versa (see also [67]). Ultimately, our view is not so far from Langer's: that choice is merely one of many factors that can amplify an almost magical belief that there is more to this game than random chance.

In recent years, the well-established biopsychosocial approach to problem gambling has been superseded by a public health approach to gambling harm, which recognizes the systemic and multi-faceted nature of gambling harm, places a greater emphasis on social factors and inequities and, accordingly, promotes a range of intervention programmes that would include not only treatment services and other programmes directed at the individual, but also population-wide attention to gambling accessibility [68,69]. Despite the shift towards a public health approach, Langer's formulation of the illusion of control has maintained its relevance to the field of gambling studies. It represents a significant advance in understanding the psychology of gambling and was a precursor to both theory and research on the antecedents and consequences of disordered gambling. However, relatively little is known about why and when illusory beliefs support excessive gambling. Such an understanding will not only serve to help develop better policies and programmes to prevent disordered gambling, but in a clinical context help treatment providers to care for those living with gambling problems.

#### DECLARATION OF INTERESTS

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