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Gamifying Cognitive Biases and Perceptual Errors: A Picture Based Crossword Puzzle

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Abstract. This work employs gamification to design an experiential exercise, in the form of a picture-based crossword puzzle, to facilitate holistic learning around common biases and errors influencing individual decision-making. In a roughly 75-minute experiential exercise, participants will be exposed to two rounds of picture-based cues, reflecting the underlined concept and/or practical application of ten major cognitive biases and seven perceptual errors. The participants are required to identify the associated bias or error using these clues in order to complete the crossword puzzle provided to them. Doing so, the exercise aims to stimulate participants' comprehension and retention of these important concepts along with boosting their levels of in-class engagement. The exercise can thus be used as an active learning tool in courses such as organizational behavior, psychology, strategic management, negotiation skills, leadership, and marketing. A follow up discussion on cognitive biases and perceptual errors is provided for classroom teaching.

Keywords: gamification, experiential exercise, decision making.

1. Introduction

Gamification is an increasingly popular and innovative teaching pedagogical technique for motivating and engaging students in education. It includes "introduction of game design elements and gameful experiences in the design of learning processes" (Dichev & Dicheva 2017; p. 2). An experiential learning exercise designed in a game-based format not only makes the learning process more interesting, engaging, and memorable (Caponetto *et al.* 2014; Schöbel *et al.* 2022), but it also simulates a competitive in-class environment, which helps students achieve their learning goals (Saxena *et al.* 2009; Memar *et al.* 2020). One interesting way to incorporate such active and experiential learning elements in regular courses is in the form of crossword puzzles. A crossword puzzle is

considered to be an effective teaching and learning tool, particularly in courses where a large number of new terms and concepts are introduced in a short span of time, necessitating sufficient practice and repetition to reinforce the core concepts and their underlying meanings and principles (Saxena *et al.* 2009). It enables students to apply and test their cognitive skills as well as practice and revisit the key concepts discussed in class, thereby enhancing student learning, comprehension, and retention. Although scant in number, crossword puzzle as gamification tool has been introduced in business studies (Buhagiar & Leo 2018). In alignment, this paper contributes to the limited number of gamification studies in management sciences.

While such crossword based active learning exercises have already been introduced in the field of medicine and nursing (see Saxena *et al.* 2009; Nazeer *et al.* 2019), management literature offers scant evidence of this (da Silva *et al.* 2019). In an attempt to fill this gap and advance gamification in the field of management education, this exercise offers a picture-based crossword puzzle around the key topics of cognitive biases and perceptual errors in decision making. Decision-making is a cognitive process aimed to select a belief or a course of action from the available set of possible alternatives. It is a key prerequisite for a successful manager and is influenced by the decision maker's underlying assumptions, perceptions, values, beliefs, and experience(s). However, managers often have a propensity to make judgments based on a rule of thumb. While providing quick and simple solutions, these rules of thumb can also lead to cognitive biases and perceptual errors. And, if one is ignorant or unaware, these cognitive biases and perceptual errors can restrict problem-solving abilities affecting the decision-making skills (Bazerman & Moore 2012). Furthermore, this can also limit one's response time, impair memory, and often lead to anxiety and depression (Gotlib & Joormann 2010). Therefore, in addition to decision-making theories and processes, instructors must also sensitize management students about the associated biases and errors.

However, students frequently misconstrue and/or conflate these biases and errors because they are exposed to numerous terminologies in a relatively short period of time, and with little opportunity for practice and review. The current exercise, thus, offers students an interesting, game-based activity to comprehend, revisit, and practice these important concepts along with a playful insight into their real-life applications. Doing so, it provides instructors with a handy learning tool to boost student learning and retention of these key concepts through an engaging and active game-based learning experience.

2. Exercise Description

This exercise provides an engaging game-based experience for management and psychology students to understand and retain important cognitive biases and

perceptual errors influencing individual decision making. The exercise is designed in a crossword puzzle format supported by picture/image driven cues. The crossword puzzle, as illustrated in Exhibit 1 (see Exhibits at the end of the article), features key perceptual errors and cognitive biases impacting individual decision making across both horizontal and vertical columns running from left to right and top to bottom respectively. To fill in each term in the crossword puzzle, participants will be provided a maximum of two cues (one each in two subsequent rounds), based on which they will have to decode and decipher the concerned bias/error. These cues will be provided in the form of a picture/image reflecting the underlying concept associated with the concerned term, thereby, appraising and testing the participants' understanding and knowledge of these concepts. The overall purpose of the exercise is to aid the process of participants' learning and comprehension while providing them an engaging and stimulating experience in class.

3. Brief about Perceptual Errors and Cognitive Biases in Decision-Making

Individual decision-making, reasoning, and understanding of reality are often marred by inaccuracies and fallacies caused by certain cognitive biases and perceptual errors. While making any kind of judgement or decision, individuals often tend to adopt simplified information processing strategies, known as heuristics (Abatecola *et al.* 2018). Individuals extensively adopt heuristics as they serve as quick shortcuts to judgement or decision-making (Gigerenzer & Gaissmaier 2011). This reliance on heuristics might lead to predictable errors known as cognitive biases (Berthet 2022). Scholars define *cognitive bias* as a systematic pattern of deviation from rationality (Haselton *et al.* 2005). Similarly, perception is a complex mechanism involving physiological and psychological process through which an individual receives, analyses, and draws meaning from any information in the environment. Making accurate judgements/decisions based on all the available information is often challenging due to likelihood of misinterpretation while perceiving information/stimuli, also known as perceptual errors (Maule & Hodgkinson 2003).

Often, these biases and errors stem from an individual's tendency to construct a subjective reality out of the exposed stimuli (Bless & Fiedler 2014; Takahashi & Mashima 2006) resulting in irrationality in decision making such as judgmental fallacies, false or inaccurate interpretation or perceptual distortions (Ariely & Jones 2008; Kahneman & Tversky 1972). Both perceptual errors and cognitive biases have wider practical implications in different disciplines of management (Kunda 1990; Schachter 1999) as they impact decision making through reliance on heuristics (Dwyer 2018), along with influence of different social (Gigerenzer & Goldstein 1996) and situational factors (Brewer *et al.* 2007). Exhibit 2 lists

common cognitive biases and perceptual errors covered through this exercise along with their influence on decision making that can be taught in classroom.

4. Learning Objectives

- Understand and reinforce the underlying premise of key cognitive biases and how they influence individual decision-making process.
- Understand and reinforce the common errors of perception influencing decision-making.
- Comprehend the key characteristics that distinguish each error and bias from the other.
- Observe and comprehend real-life implication of these errors and biases.

5. Conducting the Activity in Class

This activity is designed as a team-based exercise. Depending upon the class size and instructor's discretion, the entire class can be divided into groups/teams of three-six members each. Each team will receive a printed handout of the crossword puzzle, as shown in Exhibit 2. The cues will be shared with the participants in two subsequent rounds, namely one and two. Exhibit 3 featuring "first cue list" will be shared in round one. The participants will then be asked to identify the key biases/errors on the basis of the presented cues given in first cue list. After exhausting the first cue list in round one, the participants will receive the Exhibit 4 featuring "second cue list" for the final round.

5.1. Game Rules to Be Communicated to the Participants

1. There will be two time-based rounds in the game of 17 minutes each for the 17 terms (based on cognitive biases and perceptual errors) included in the crossword.
2. For each term, two cues will be provided – one with "first cue list" as part of round one and other with 'second cue list' as part of round two.
3. All correct identifications with the help of just first cue i.e., at the end of round one will be rewarded five marks each.