

Redirecting the Playing Cards for Cost-effective Cognitive Remediation: An Innovation Using Indigenous Resources

Sujita Kumar Kar¹ , Amit Singh¹, Aditya Somani²  and Ravindra Kumar Garg³ 

Cognitive remediation is an effective modality of therapeutic intervention that has beneficial roles in various neurocognitive disorders, traumatic brain injury, and cognitive impairments associated with several neurological and psychiatric disorders.¹ Cognitive remediation techniques have significantly evolved in the past several decades regarding the underlying principle, the process by which it is being delivered (online or offline), and the settings where it is being carried out (clinic-based or home-based). Most cognitive remediation or cognitive training procedures require expert guidance and are expensive.^{2,3} However, researchers developed several techniques that require minimum expertise supervision and are cost-effective (e.g., grain sorting task). Researchers attempted to use standard playing cards for their possible role in cognitive stimulation.⁴ As playing cards are popular among people across the

globe and people remember the colors, patterns, and concepts related to playing cards due to their likability,⁴ it can be innovatively used for cognitive remediation for various disorders with neurocognitive impairment. This article focuses on exploring the utility of playing cards as a tool for cost-effective cognitive remediation. Existing research on the use of playing cards for various cognitive stimulation purposes is highly heterogeneous in terms of the type of cards used, the techniques used to engage individuals in the tasks, and the explanatory models used to explain the process.⁴⁻⁷ Despite the heterogeneity, they have several conceptual similarities (social engagement, cognitive domains targeted, familiarity of card-playing task with the population engaged), which can help conduct similar card-based future research.

Card-playing is a standard and century-old entertainment modality across the globe. In India, the typical playing

cards are available at reasonable prices (a minimum of approximately ₹40, which nearly corresponds to 0.5 US dollars). Most Indians, irrespective of their socioeconomic status and educational status, are familiar with the numbers, colors, and symbols used in these cards and their sequences. These cards are readily available in households and are sold in even tiny shops in rural and urban areas. A typical pack (set) of playing cards consists of 52 standard cards and two extra cards containing symbols of jokers. The standard 52 cards contain 26 each of black and red colored cards. Again, the black and red colored cards are divided into 13 cards, each with different symbols (Diamond and heart in red; club and spade in black).⁸ A typical set of 13 cards consists of Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King, where Ace contains a single symbol (one of the four symbols), and Jack, Queen, and King cards have alphabets “J”, “Q” and “K” with one

¹Dept. of Psychiatry, King George's Medical University, Lucknow, Uttar Pradesh, India. ²Dept. of Psychiatry, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India. ³Dept. of Neurology, King George's Medical University, Lucknow, Uttar Pradesh, India.

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Address for correspondence: Sujita Kumar Kar, Dept. of Psychiatry, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.
E-mail: drsujita@gmail.com

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figure each referring to Jack, Queen and King respectively (Figure 1). Researchers used “playing cards” beyond the entertainment domain. Playing cards are used to introduce and facilitate mathematics learning in small children.⁹ Card-playing has been found to have a cognitively stimulating effect and improves social cognition.⁴⁻⁶

A Chinese study evaluated the effect of playing cards or Mahjong on cognitive functioning in older adults, and it was found that those individuals who regularly or occasionally play cards have better cognitive function than those who never play them.¹⁰ In this study, the card-playing older adults have significantly better attention, language ability, and calculation functioning.¹⁰ Several other pieces of evidence support the beneficial role of playing Mahjong in cognitive stimulation in older patients and people with cognitive impairment.^{11,12} Playing cards not only causes cognitive stimulation but also enhances social engagement.⁷ In recent research involving children between seven and 12 years of age, it was found that modern board games and card games improve cognitive flexibility, response inhibition, and, to some extent, the working memory domain.¹³

However, for cognitive training of an individual, cards can be used with specific tasks intended to target specific cognitive functions. The individual may perform the task solo with minimal supervision. Several simple cognitive stimulating tasks can be designed using the basic principles of cognitive stimulation used in the Wisconsin card sorting task,¹⁴ that can be used for patients with cognitive deficits (Table 1).

In order to complete the task, the individual will need to utilize their ability to identify numbers, figures, symbols, and colors. Paying close attention and maintaining concentration during these tasks is crucial, and practicing them regularly can improve attention, concentration, and processing speed. Specific tasks, such as identifying missing cards, can also help to enhance selective attention. More complex tasks, like sorting the cards based on their symbols and arranging them in a sequence, require working memory. Additionally, all tasks involve planning and components of response inhibition, which can contribute to

FIGURE 1.
Structural Overview of Playing Cards.

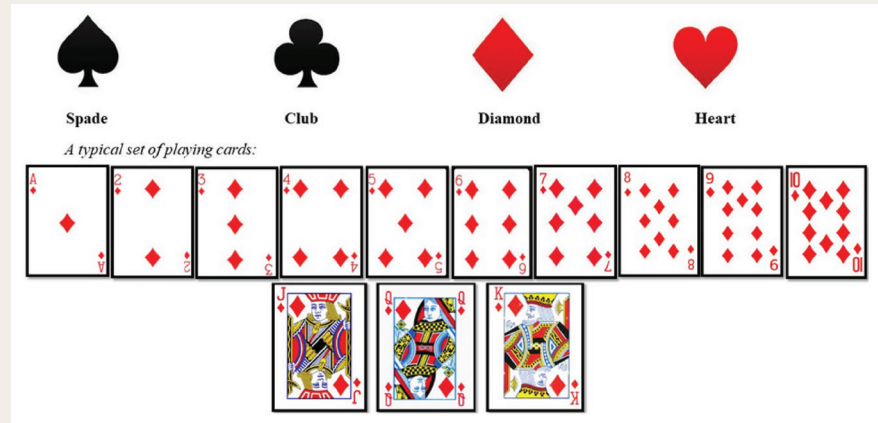


TABLE 1.
Cognitive Stimulating Tasks Using Playing Cards.

Sl. No.	Description of the Task	What the Individual is Supposed to Perform?
1	Picking a specific card from the set of 52 cards as instructed	The therapist/supervisor can ask the individual to pick a specific card from the set of 52 cards (e.g., Diamond Two), and the individual should find the card from the set
2	Sort out the cards on the basis of colors	Separating the cards into two groups (Red & Black)
3	Sort out the cards on the basis of symbols (shapes)	Separating the cards into four groups (Club, Diamond, Heart, and Spade)
4	Sort out the cards on the basis of numbers	Separating the cards into nine groups (2-10)
5	Sort out the cards on the basis of alphabets written on them	Separating the cards into four groups (A, J, Q, K)
6	Randomly pick any two cards of different colors or symbols (shapes). Complete the sequence of both the selected cards in increasing order (Note: “A” needs to be counted as one as it contains only one shape or symbol)	Separating all the cards with colors/symbols matching that of the selected cards in two groups. Arranging all the sorted-out cards in an increasing order (A-10)
7	Separate the cards with odd and even numbers	Separating the cards into two groups on the basis of odd and even numbers (“A” needs to be counted as 1)
8	Arrange the cards in a sequence with alternate colors	The cards can be arranged in a sequence where the consecutive cards should not be of same color (e.g., Diamond Ace, club two, Heart three, club four...etc.)
9	Remove 10 cards from the set of cards. Tell the cards that are missing	The patient is expected to name the cards with their number and symbol
10	Five arbitrary cards with figure will be flashed before the patient for 10 seconds and then they will be hidden. The patient will be asked to name the cards	The patient is expected to name the cards with the figure (Jack, Queen, King) and Symbol (Diamond, Spade, Club, Heart) NB: If the individual is not able to perform, then the number of cards can be reduced to three. If the individual performs the task, the number of cards can be increased
11	Sequencing the figured cards	The individual is supposed to sequence the figured cards in a sequence of Jack, Queen, and King (irrespective of their color) in four stacks
12	Complex sequencing of the cards	The individual is supposed to sequence the figured cards of the same symbol in a sequence of Jack, Queen, and King in four stacks (e.g., Jack, Queen, and King of Diamond in a sequence)

improvements in executive function. Recent research that segregated the card games into two groups based on their ability to do cognitive stimulation (basic executive function stimulating card games and other cognitive functions stimulating card games) found that participants showed improvement in cognitive flexibility and response inhibition, irrespective of the game they participated in.¹³ The above game strategies can potentially change cognitive flexibility and response inhibition.

This model of intervention may have specific limitations. Individuals with severe cognitive impairment, visual impairment, and motor impairment (paralysis of hands) may not be effectively engaged in the task. Severe behavioral problems may interfere with engagement in tasks. However, it may be beneficial for patients with cognitive deficits due to neurocognitive disorders, traumatic brain injury, neurological disorders, and psychiatric disorders. The number of cards can be increased by increasing the number of sets. As one set contains 52 cards, the number can be increased to 104 or 156 by mixing two or three sets of cards, respectively. The instructions can be explained to a readily available caregiver, who may clearly explain the instructions and monitor the cognitive stimulation card-playing tasks. This technique is essential as the exclusive cognitive intervention or as an add-on to ongoing pharmacotherapy. However, the task may be concurrently initiated as an early add-on treatment to underlying pharmacological treatment. At this stage, there need to be adequate trials utilizing the above techniques

to support the effectiveness of these card-playing strategies. More research is required utilizing these techniques to build up evidence of a card-based cognitive remediation strategy.

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ORCID iDs

Sujita Kumar Kar  <https://orcid.org/0000-0003-1107-3021>

Amit Singh  <https://orcid.org/0000-0001-8877-8869>

Aditya Somani  <https://orcid.org/0000-0002-3283-0362>

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