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Cognitive training of self-initiation of semantic encoding strategies in schizophrenia: A pilot study

Synthia Guimond\textsuperscript{1,2} and Martin Lepage\textsuperscript{1,3}

\textsuperscript{1}Douglas Mental Health University Institute, Montreal, Canada
\textsuperscript{2}Department of Psychology, McGill University, Montreal, Canada
\textsuperscript{3}Department of Psychiatry, McGill University, Montreal, Canada

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Available cognitive remediation interventions have a significant but relatively small to moderate impact on episodic memory in schizophrenia. The present study aimed to evaluate the efficacy and feasibility of a brief novel episodic memory training targeting the self-initiation of semantic encoding strategies. To select patients with such deficits, 28 participants with schizophrenia performed our Semantic Encoding Memory Task (SEMT) that provides a measure of self-initiated semantic encoding strategies. This task identified a deficit in 13 participants who were then offered two 60-minute training sessions one week apart. After the training, patients performed an alternate version of the SEMT. The CVLT-II (a standardised measure of semantic encoding strategies) and the BVMT-R (a control spatial memory task) were used to quantify memory pre- and post-training. After the training, participants were significantly better at self-initiating semantic encoding strategies in the SEMT ($p = .004$) and in the CVLT-II ($p = .002$). No significant differences were found in the BVMT-R. The current study demonstrates that a brief and specific...
training in memory strategies can help patients to improve a deficient memory process in schizophrenia. Future studies will need to test this intervention further using a randomised controlled trial, and to explore its functional impact.

**Keywords**: Schizophrenia; Memory training; Semantic encoding strategies; Episodic memory

**INTRODUCTION**

When a person goes to the grocery store and attempts to remember a list of items to buy, he will naturally regroup in his memory the items in different categories (e.g., fruits, vegetables, meat...). This ability to spontaneously use the semantic information to form a relation between items and thus facilitate their subsequent recognition or recall is referred to as the self-initiation of semantic encoding strategies. Individuals with schizophrenia have difficulties initiating such strategies. Indeed, previous studies have demonstrated that patients use less semantic clustering than healthy controls when they are asked to recall a list of words (Brébion, David, Jones, & Pilowsky, 2004; Gsottschneider et al., 2011; Hazlett et al., 2000). However, when individuals with schizophrenia were specifically trained to regroup the words in categories during the encoding of the list, or if the names of the categories were provided just before the encoding, they were able to increase their number of semantic clusterings (Chan et al., 2000; Fiszdon, Choi, Bryson, & Bell, 2006).

It is now well established that patients with schizophrenia have episodic memory impairments (Achim & Lepage, 2005; Danion, Huron, Vidailhet, & Berna 2007; Lepage, 2007), and greater difficulties with associative or relational memory than with item memory (Lepage et al., 2006). As recently suggested by Bonner-Jackson and Barch (2011), this specific deficit to form and recall associations between items in schizophrenia could therefore in part be driven by a deficit to self-initiate efficient semantic encoding strategies.

Memory deficits in schizophrenia are related to poor community functioning and diminished psychosocial skills (Evans et al., 2004; Green, Kern, Braff, & Mintz, 2000). To date, pharmacological intervention trials have not demonstrated any clear positive impact on memory performance in schizophrenia (Genevsky, Garrett, Alexander, & Vinogradov, 2010; Minzenberg & Carter, 2012). Hence, there is a great need to develop complementary non-pharmacological approaches to improve memory functions in schizophrenia. Cognitive remediation therapy is the most common intervention used to improve cognition in schizophrenia and has a significant but relatively
small to moderate impact on episodic memory (McGurk, Twamley, Sitzer, McHugo, & Mueser, 2007; Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). When strategy use is explicitly taught in this cognitive therapy, better functioning outcomes are achieved (Wykes et al., 2011). Therefore, it could be beneficial to tailor those strategies to individuals according to their impairments in specific cognitive domains, such as episodic memory.

This pilot study sought to improve the self-initiation of semantic encoding strategies in people with schizophrenia. Our goal was to develop a semantic encoding strategies training and to evaluate its efficacy to improve associative episodic memory in schizophrenia. To accomplish this, participants with enduring schizophrenia and an established deficit in self-initiation of semantic encoding strategies were first selected. Then training, consisting of two 60-minute weekly sessions on semantic encoding strategies, was provided. In these sessions, participants practised different computerised exercises on how to make semantic links between items to memorise. It was hypothesised that this training would significantly increase memory performance in the condition where self-initiation of semantic encoding strategies was needed in our Semantic Encoding Memory Task (SEMT) and in the California Verbal Learning Test (CVLT-II), a standardised measure of semantic encoding strategies. A spatial memory task (Brief Visuospatial Memory Test–Revised; BVMT-R) was administered to examine the specificity of the training and it was hypothesised that performance on this task would not be influenced by such a training.

METHOD

Design

This study used an uncontrolled design recommended to evaluate initial efficacy and feasibility of novel interventions with patients (Mueser & Drake, 2005). The cognitive intervention developed in the current study specifically targeted individuals with schizophrenia having difficulties self-initiating semantic encoding strategies. The intervention was delivered individually by one of the authors (S.G.) and supervised by a licensed neuropsychologist (M.L.). The sessions took place in a quiet room at the Douglas Mental Health University Institute, Montreal, QC, Canada.

Study participants

Participants were recruited via advertisements, from different outpatient units at the Douglas Mental Health University Institute, Montreal, QC, Canada, and from external and community-based mental health clinics. We excluded individuals with (1) a lifetime history of medical or neurological conditions that have been shown to affect cognition, (2) a family history of
hereditary neurological disorders (e.g., Huntington’s disease), (3) a diagnosis of substance dependence (current or within the past three months), (4) presence of depression or Parkinsonism. From the 28 individuals with enduring schizophrenia recruited, 13 with deficits to self-initiate semantic encoding strategies were selected for the training (see Measures section below). One participant dropped out prior to study completion, due to admission to an intensive rehabilitation programme. Only participants who completed the training \((n = 12)\) were included in the analyses. Information on current medication was obtained via self-report and corroborated when necessary with the treating psychiatrist. Antipsychotic doses were converted to chlorpromazine equivalents according to the literature (Jensen & Regier, 2010; Leucht et al., 2014; Woods, 2003). The study was approved by the Douglas Mental Health University Institute’s Research Ethics Board and all participants provided informed written consent.

Measures

All participants were assessed at baseline with the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 1998) to confirm their diagnosis and with the Wechsler Abbreviated Scale of Intelligence (WASI) (Hays, Reas, & Shaw, 2002) to confirm that their IQ was greater than 70. Clinical symptoms were assessed using the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1984a) and the Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984b). The Hamilton Anxiety Scale (HAS; Riskind, Beck, Brown, & Steer, 1987) and the Calgary Depression Scale (CDS; Addington, Addington, & Maticka-Tyndale, 1993) were also administered to all participants. All these clinical assessments were performed by research staff not involved with the current intervention.

All participants completed the first five trials of the California Verbal Learning Test (CVLT-II; List A or B) to assess objectively their use of semantic clustering (Delis, Kramer, Kaplan, & Ober, 1987). Importantly, only the first five trials were administered to the participants to prevent prompting the use of semantic encoding strategies with the name of the categories. The Brief Visuospatial Memory Test–Revised (BVMT-R) was used as a control for the practice effect, as well as a discriminant measure of the training specificity (Benedict, Schretlen, Groninger, Dobraski, & Spritz, 1996). To assess the memory control beliefs of the participants pre- and post-training, the three subscales (Present Ability, Potential Improvement, and Effort Utility) of the Memory Controllability Inventory (MCI) were administered (Lachman, Bandura, Weaver, & Elliott, 1995).

Following these tests, participants completed the Semantic Encoding Memory Task (SEMT). Figure 1 illustrates the different components of this associative episodic memory task that we developed to target the self-initiation of semantic encoding strategies. Participants were instructed to
remember 128 pairs of items. For half of the trials, they had to determine whether or not both objects were from the same category (indicated by the cue “Category?”) by pressing 1 if the objects were from one category and 2 if the objects were from two different categories. For the other half of the trials, they had to determine which object was bigger in real life (indicated by the cue “Bigger?”) by pressing 1 if it was the first object of the pair or 2 if it was the second object. Half of the pairs belonged to the same category and the other half belonged to different categories. All conditions were pseudo-randomised in six different versions of the task and counterbalanced across participants, and time of measures (pre- and post-training). The condition targeting self-initiation of semantic encoding strategies was created when both objects were from the same semantic category and the orienting question was about the size (Bigger?). Indeed, in this condition, participants were not explicitly cued to use the semantic information, but could benefit from self-initiating semantic encoding strategies to encode both objects of the pair. After the encoding task, participants were asked to perform a forced-choice recognition task. They had to determine which of the four objects (all presented as a second object in the encoding task) was the one paired with the first object appearing on the left side of the screen (see Figure 1). The participants also filled out a Subjective Strategies Encoding questionnaire at the end of the task to investigate at which level they used self-initiation of semantic encoding strategies. This questionnaire asked how much participants thought they used three different encoding strategies (repetition, visualisation, and semantic strategies; see Supplementary Material 1). In order not to influence or prompt the participants to use a specific strategy, they were told that all these strategies were helpful and could have been used during the encoding task.

We started with the assumption that participants who were able to self-initiate semantic encoding strategies during the associative episodic...
memory task would have similar performance when both objects to memorise were from the same category irrespective of the encoding question (“Category?” or “Bigger?”). Hence, the selection of the patients to whom training would be offered was based on their recognition performance in these two conditions. To be selected for training, a participant needed to show a decrease in performance (of at least 10%) when the encoding cue was “Bigger?” compared to when the encoding cue was “Category?”.

Alternate versions of the CVLT-II, the BVMT-R, and the SEMT were administered after the training, as well as the same subscales of the MCI, and the subjective strategies encoding questionnaire. Finally, participants were asked about their satisfaction with the training to evaluate the feasibility and the acceptance of the intervention (see Supplementary Material 2 online).

Training

We developed a training adapted to a selective memory deficit often experienced by individuals with schizophrenia. It focuses specifically on the elaboration of self-initiation of relevant semantic encoding strategies. The training consisted of two 1-hour training sessions. At the beginning of the first session, a meta-memory presentation introducing the objective of the training was given to the participants. The presentation was first shown to the participants alone in front of the computer. After this, the trainer briefly discussed with the patient to ascertain that he or she completely understood the presentation. In the first part of the training session, we explicitly taught the participants how to use the semantic information related to different stimuli to organise information by grouping items together more easily. They first practised with a task with explicit instructions and cues to help them to categorise different items. The self-initiation conceptually means that, by themselves, the patients need to be able to initiate appropriate and efficient strategies related to the material they have to encode. Therefore, four different exercises were created to make participants practise these strategies using different types of stimuli (visual, auditory, verbal and non-verbal). For example, patients needed to memorise pictures of objects in different rooms, food verbally ordered by people in a restaurant, grocery lists, and word pairs. At the end of both sessions, some time was allocated for a bridging activity during which we asked for feedback about the activities and discussed with the participants the usefulness of applying efficient semantic encoding strategies in their daily life. After the first session, participants were asked to find an example in their daily life where they could use the strategies they learned to improve their memory as homework, and we discussed this example at the end of the second training session. The details about the presentation and the exercises used for the training sessions can be found online in Supplementary Material 3.
Statistical analysis

To first evaluate the performance of participants during the encoding of the SEMT depending on the time of measure (pre- vs. post-training) and of the orientation question (Bigger? vs. Category?), and their interaction, a $2 \times 2$ repeated measures analysis of variance (ANOVA) was performed. Because of a technical problem, two participants had incomplete recorded responses for the encoding task and were then excluded for this specific analysis only. A $2 \times 2 \times 2$ repeated measures ANOVA was performed on the performance on the SEMT recognition with the time of measure, pre-vs. post-training, the orientation question, Bigger? vs. Category?, and the semantic relatedness, not semantically related (NSR) vs. semantically related (SR), as factors. Planned paired $t$-test comparisons were then conducted to determine precise differences between pre- and post-training on the SEMT recognition task performance using a Bonferroni correction (critical $p$-value = .013). Participants’ subjective evaluation of their use of semantic encoding strategies for the SR conditions after having completed the recognition task of the SEMT before and after the training was also investigated using paired $t$-tests and Bonferroni correction (critical $p$-value = .025). Differences pre- and post-training for the CVLT- II Trials 1–5 corrected total and Semantic Clustering (Chance-Adjusted) Trials 1–5, the BVMT-R delayed recall and recognition index, and the three subscales of the MCI were assessed using paired $t$-test comparisons and Bonferroni correction (critical $p$-value = .007). Considering the small sample size, we also included a standardised mean effect size (Cohen $d'$) to all the pre- and post-training $t$-tests. All analyses were conducted using SPSS version 20 (SPSS, Chicago, IL, USA).

RESULTS

Clinical and demographic data

Table 1 presents the clinical and demographic data of participants who were included in and excluded from the training. Patients who were included in the training had higher depression scores on the CDS, but did not significantly differ on any other variables.

Training outcomes

SEMT

Participants performed well during the encoding task before (mean = 80%, $SD = 10\%$) and after the training (mean = 84%, $SD = 12\%$). The repeated
### TABLE 1
Demographic, neuropsychological and clinical data

<table>
<thead>
<tr>
<th></th>
<th>Included (n = 13)</th>
<th></th>
<th></th>
<th>Excluded (n = 15)</th>
<th></th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>33.07</td>
<td>7.19</td>
<td>22–50</td>
<td>32.73</td>
<td>9.14</td>
<td>21–49</td>
<td>.27</td>
</tr>
<tr>
<td>Age of onset</td>
<td>22.46</td>
<td>4.92</td>
<td>18–32</td>
<td>21.6</td>
<td>5.65</td>
<td>15–35</td>
<td>.93</td>
</tr>
<tr>
<td>Duration of illness</td>
<td>10.61</td>
<td>4.85</td>
<td>4–20</td>
<td>11.13</td>
<td>7.38</td>
<td>4–31</td>
<td>.44</td>
</tr>
<tr>
<td>SAPS</td>
<td>15.23</td>
<td>9.31</td>
<td>0–27</td>
<td>13.5</td>
<td>8.87</td>
<td>0–25</td>
<td>.91</td>
</tr>
<tr>
<td>SANS (without attention)</td>
<td>21.69</td>
<td>7.9</td>
<td>6–38</td>
<td>16.46</td>
<td>10.38</td>
<td>0–38</td>
<td>.39</td>
</tr>
<tr>
<td>CDS</td>
<td>3.3</td>
<td>4.92</td>
<td>0–13</td>
<td>2</td>
<td>1.85</td>
<td>0–6</td>
<td>.003</td>
</tr>
<tr>
<td>HAS</td>
<td>5.5</td>
<td>6.4</td>
<td>0–21</td>
<td>6.2</td>
<td>5.8</td>
<td>0–17</td>
<td>.84</td>
</tr>
<tr>
<td>IQ</td>
<td>99.6</td>
<td>12.56</td>
<td>79–121</td>
<td>104.4</td>
<td>12.94</td>
<td>79–125</td>
<td>.88</td>
</tr>
<tr>
<td>Medication (mg chlorpromazine)</td>
<td>987.53</td>
<td>1319.9</td>
<td>10.7–4835</td>
<td>757.11</td>
<td>435.24</td>
<td>166.25–1711</td>
<td>.57</td>
</tr>
<tr>
<td><strong>SEMT Recognition (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR Bigger?</td>
<td>66.85</td>
<td>12.92</td>
<td>47–87</td>
<td>77.54</td>
<td>8.64</td>
<td>63–91</td>
<td>.01</td>
</tr>
<tr>
<td>SR Category?</td>
<td>79.23</td>
<td>11.67</td>
<td>60–97</td>
<td>75.33</td>
<td>12.28</td>
<td>47–94</td>
<td>.39</td>
</tr>
<tr>
<td>NSR Bigger?</td>
<td>41.42</td>
<td>18.13</td>
<td>13–81</td>
<td>42.27</td>
<td>16.32</td>
<td>16–72</td>
<td>.89</td>
</tr>
<tr>
<td>NSR Category?</td>
<td>37.75</td>
<td>13.21</td>
<td>16–53</td>
<td>37.47</td>
<td>14.11</td>
<td>22–75</td>
<td>.96</td>
</tr>
<tr>
<td><strong>CVLT-II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total trials 1–5</td>
<td>46.77</td>
<td>12.22</td>
<td>17–59</td>
<td>47.33</td>
<td>8.89</td>
<td>34–62</td>
<td>.88</td>
</tr>
</tbody>
</table>

*(Continued)*
TABLE 1 Continued.

<table>
<thead>
<tr>
<th></th>
<th>Included ((n = 13))</th>
<th>Excluded ((n = 15))</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
</tr>
<tr>
<td>Semantic clustering 1–5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(chance adjusted)</td>
<td>0.57</td>
<td>1.17</td>
<td>−1.04–2.84</td>
</tr>
<tr>
<td><strong>BVMT-R</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed recall</td>
<td>22.31</td>
<td>7.42</td>
<td>11–31</td>
</tr>
<tr>
<td>Recognition</td>
<td>5.62</td>
<td>0.65</td>
<td>4–6</td>
</tr>
<tr>
<td><strong>MCI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present ability</td>
<td>4.90</td>
<td>1.17</td>
<td>2.7–6.5</td>
</tr>
<tr>
<td>Effort utility</td>
<td>5.54</td>
<td>1.65</td>
<td>1–7</td>
</tr>
<tr>
<td>Potential improvement</td>
<td>5.28</td>
<td>1.47</td>
<td>1–6.7</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male n (%)</td>
<td>9</td>
<td>(69)</td>
<td></td>
</tr>
<tr>
<td>Female n (%)</td>
<td>4</td>
<td>(31)</td>
<td></td>
</tr>
</tbody>
</table>

Independent *t*-tests were performed to investigate between-group differences for all variables, except for the gender where a Kruskal-Wallis test was used. Post-hoc correlations between medication and memory measures (SEMT, CVLT-II and BVMT-R) did not reveal any significant relationships between these variables.

SAPS = Scale for the Assessment of Positive Symptoms; SANS = Scale for the Assessment of Negative Symptoms; CDS = Calgary Depression Scale; HAS = Hamilton Anxiety Scale; SEMT = Semantic Encoding Memory Task; CVLT = California Verbal Learning Test; BVMT-R = Brief Visuospatial Memory Test–Revised; MCI = Memory Controllability Inventory.
measures ANOVA on the performance on the encoding task revealed a significant difference between the questions asked, $F(1, 9) = 6.22, p = .03$, no significant main effect of the time of measure, $F(1, 9) = 1.08, p = .33$, and no significant interaction, $F(1, 9) = 0.00, p = .99$. Even if they correctly answered the majority of the trials, participants seemed to have had better accuracy when the question was “Category?” than when it was “Bigger?”. The absence of a significant interaction confirms that this bias was present to the same extent prior to and after the training. All participants performed above the chance level for the forced-choice recognition task.

Figure 2 illustrates the percentage of correct answers for every condition of the recognition task pre- and post-training. The repeated measures ANOVA on recognition performance revealed a significant interaction between the orientation question and the time of measure, $F(1, 11) = 9.50, p = .01$. Paired $t$-tests performed to investigate the pre- and post-training effect showed a significant difference only in the targeted condition where participants had to self-initiate semantic encoding strategies (SR Bigger?), $t(11) = -3.57, p = .004, d = 1.04$. This is also concordant with the subjective report.

![Figure 2](image-url)

**Figure 2.** Percentage of correct answers on the recognition for the Semantic Encoding Memory Task (SEMT) pre- and post-training. The results are presented separately for each condition: when both objects were semantically related (SR) and the question during the encoding was Bigger?; when both objects were semantically related (SR) and the question during the encoding was Category?; when both objects were not semantically related (NSR) and the question during the encoding was Bigger?; when both objects were not semantically related (NSR) and the question during the encoding was Category? The dotted line represents the chance level of the percentage of correct answers. The $p$-value and Cohen’s $d$ are reported for every pre- and post-training comparison.
that participants gave regarding their use of semantic encoding strategies. Indeed, they reported they used semantic encoding strategies more often for the targeted condition after the training, \( t(11) = 2.75, p = .02, d = 0.80 \) (see Figure 3).

**CVLT-II, BVMT-R, and MCI**

As shown in Figure 4, participants significantly increased the total of words recalled for trials 1–5, \( t(11) = 4.39, p = .001, d = 1.27 \), and their number of semantic clustering, \( t(11) = 4.14, p = .002, d = 1.20 \). No significant improvements were reported on the BVMT-R for the delayed recall, \( t(11) = 1.07, p = .31, d = 0.31 \), or for the recognition, \( t(11) = 0.80, p = .44, d = 0.23 \). In addition, no significant pre- and post-training differences were found for the MCI, Present Ability: \( t(11) = 0.65, p = .53, d = 0.19 \), Potential Improvement: \( t(11) = 0.71, p = .49, d = 0.34 \), or Effort Utility: \( t(11) = 0.38, p = .71, d = 0.21 \).

**Feasibility of the training**

The descriptive comments about the satisfaction with the training gathered in the questionnaire highlight that participants describe the training as interesting, challenging, useful, feasible, and pleasant. Based on the answers on a Likert scale with scores from 1 to 5 (where 1 = not at all, 3 = moderately, and 5 = very much), the majority of patients indicated that they enjoyed participating in the training (mean = 4.2, SD = 0.63). Generally, participants also reported a subjective improvement of their memory following the training (mean = 3.4, SD = 0.70), the belief that they are now better at using
DISCUSSION

The aim of this study was to evaluate the efficacy of a novel memory training targeting specific deficits in semantic encoding strategies in individuals with enduring schizophrenia. The current results suggest that patients may improve the self-initiation of semantic encoding strategies following this specific training. The participants clearly improved their performance in the condition of the SEMT where self-initiation of semantic encoding strategies was needed, and in the CVLT-II measures. The effect seems to be generalised to different measures involving the same encoding strategies. As expected, no significant pre- and post-training differences were observed for the semantic encoding strategies (mean = 3.7, SD = 0.83), and that the training may help them in their everyday life (mean = 3.7, SD = 0.95).
control task (BVMT-R), and for the conditions of the SEMT where self-initiation of semantic encoding strategies was not needed. The positive effect of the training observed only on targeted self-initiation of semantic encoding strategies in patients suggests a good specificity of our intervention.

Medalia, Revheim, and Casey (2000) studied the impact of cognitive remediation therapy on memory disorders in schizophrenia and failed to show any significant improvement on memory performance after the training. In this study, there was no a priori selection of the participants based on their memory capacity. Moreover, during the training sessions, they had to perform several activities implicating different types of memory and strategies (working memory, short-term memory, episodic memory, and spatial and verbal memory). This study, as well as the majority of others using cognitive training (see Twamley, Jeste, & Bellack, 2003), did not target a specific memory process. We believe that the use of a one-size-fits-all approach, which is a typical method for improving memory deficits in schizophrenia, is unlikely to be the most efficient intervention with this population. There are many individual differences with regard to faulty episodic memory processes in schizophrenia (Brazo, Ilongo, & Dollfus, 2013; Turetsky et al., 2002) and it could be beneficial to develop a training that focuses on specific strategies to effectively memorise information in a given context. In line with this, Pillet et al. (2014) observed that individuals with schizophrenia, who benefited most from cognitive remediation therapy, seem to be those with a lower initial level of memory. Targeting patients with memory deficit before the therapy could thus be an efficient approach. It is also possible that individuals with less difficulty with memory could benefit more from interventions adapted to their need and focusing on the different cognitive deficits that they experience. In the current study, we developed an associative episodic memory task to target individuals with schizophrenia with difficulty self-initiating adequate semantic encoding strategies. As Bonner-Jackson and Barch (2011) suggested, it seems that deficits in self-initiation of semantic encoding strategies can affect the associative episodic memory performance in some patients. The fact that less than half of our initial sample showed this deficit supports the need to consider individual differences between patients in the development of cognitive interventions. In the current study, we observed clear positive improvements after the training in the mnemonic process targeted in only two 1-hour training sessions. An approach focusing on the tangible deficit that patients with schizophrenia are experiencing could thus be more efficient than actual interventions that aim to improve general cognition or memory.

Another goal of the current study was to provide some evidence for the feasibility of a specific training targeting the improvement of self-initiation of semantic encoding strategies with individuals with enduring schizophrenia. The overall attendance rate of completers (12/13) and the feedback received can be seen as two positive indicators of the feasibility of the training. The
present results suggest thus that the proposed training is feasible and acceptable to the patients.

This pilot study has nonetheless some limitations that need to be mentioned. The small size of our sample may have led to Type 2 errors in the results. Nonetheless, we still observed significant effects with large effect sizes on our measures of interest. As mentioned earlier, this study did not include a control group, and it is possible that the observed effects were due to variables other than the training itself. The aim of this study was to evaluate the impact and the feasibility of new memory training, but we decided to include a control task assessing the specificity of the intervention. The fact that our participants only improved their performance on the targeted tasks and conditions, and not on the control task, may increase the confidence that the observed changes in performance are related to the specific training. We tried to reduce as much as possible the possibility of prompting semantic encoding strategies in our measures of interest. However, the absence of a control group limits the conclusion that can be drawn from this study and, as such, other explanations for the findings are possible. Future research is needed to examine the relative efficacy of the proposed encoding strategies training compared to another type of intervention in a randomised controlled trial and to examine its impact on real-life functioning.

To summarise, this study investigated the impact and the feasibility of a new approach regarding memory intervention in schizophrenia. Training schizophrenia patients to improve their self-initiation of semantic encoding strategies seems to improve their performance on related episodic memory tasks where these strategies were needed. Taking into account individual differences and focusing on the current deficit that patients with schizophrenia present could therefore be an efficient way to develop new cognitive treatments. Further randomised and controlled studies using this approach with individuals with schizophrenia are needed, and should therefore be encouraged.

REFERENCES


