Public Figures as Training Material for Error-less Learning for MCI

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Abstract

Error-less learning (EL) refers to a learning method without experiencing errors during learning process. Some have proven that the training through EL can improve the memory function of people who exhibit mild cognitive impairment (MCI) and also that of people in early stage of dementia (PwD). There is however an issue in deploying the learning method, namely, participants are often not interested to take part in the training. In this study, we introduce masks of public figures to the learning method to motivate target users to take part in the training to improve their memory.

Key words

Mild Cognitive Impairment, Error-less learning, Cognitive training, Memory rehabilitation, Face-name association

1. Introduction

Mild Cognitive Impairment (MCI) can be early symptoms of dementia (Nordlund et al., 2005). It can also be seen as a transition from a normal condition to an early stage of dementia (Petersen and Negash, 2008). People exhibiting MCI are most likely to suffer from dementia in near future (Petersen, 2011; Gauthier et al., 2008). Others point out that people exhibiting MCI will be demented for a year with the possibility from 16 to 41% according to Kurz et al.(2009).

Cognitive training aims to improve the cognitive function of the elderly with dementia or MCI. Some studies found that error-less learning (EL) may help them to improve the function of working memory more effectively than other types of learning methods such as errorful learning (EF) (Kurz et al., 2009; Akhtar et al., 2006; Hyer et al., 2015; Roberts et al., 2016).

Learners can complete some task with fewer errors when the learning program is designed based on EL method. Participants are presented a target with some clue in a training for memory rehabilitation. Participants are then asked to remember the target with the clue. Participants are examined to see the effects of training with a cued test, where they are asked to recall the target along with the clue. They are further asked to recall targets without clues when the rehabilitation training ends to investigate the effect of training (Baddeley and Wilson, 1994; Akhtar et al., 2006; Roberts et al., 2016;).

The ways the targets shown to learners are different between the error-less learning (EL) and the errorful learning (EF) . Participants are shown targets with associated clues when the learning program is designed based on EL, but they are only shown clues and are forced to conjecture the associated targets with them when it is designed based on EF The following example illustrates how these two methods are different by referring to the findings by Akhtar et al.'s (2006). The researcher gives a subject 'WA' as clue, which is the first two letters of the target word,

'WATER'. The experimenter tells him under EL condition, "I am thinking of a word beginning with 'WA' and the word is 'WATER'". He tells under EF condition, "I am thinking of a word beginning with 'WA'. Can you guess what it is?"

The effect of training usually is better under the condition of EL than that of EF. Akhtar et al.(2006) summarized the advantages of training based on EL in three aspects. Firstly, EL always results in positive performance than EF. Secondly, EL allows learners to feel a higher degree of self-efficacy than EF does when those two methods are applied to the memory task. Learners feel more benefited from EL than from EF. Thirdly, the effect of training can be transferred to other tasks when they are trained under EL condition, namely, they can apply better what they learnt to deal with unfamiliar tasks, resulting in acquiring new items of information.

2. Hypothesis and originality

The training effect of EL on MCI participants is significantly positive. However, people exhibiting MCI may be resistant to EL training due to uninteresting topics for training such as word lists or the face-name association (Clare et al., 1999; Akhtar et al., 2006). EL training may be more acceptable and effective for them if materials used are more familiar to them.

The present study aims to make targets of memory task attractive to trainee to encourage them to engage in a training based on the result by Akhtar et al. (2006). We discuss whether the effect of training, that is, the improved memory, may last for a while when the participants remember things for other occasions. We employ masks depicting public figures, which influence people positively, because they always seem to be more attractive than ordinary people or unfamiliar caregivers when they try to associate a face with a name and vise versa. Furthermore, wearing masks on face may be more interesting than the conventional way for presentation with pictures or words when the experimenter presents targets to participants.

We hypothesize that using interesting objects such as masks for training may result in a successful outcome consistent with the findings by Akhtar et al.'s(2006) in real life situations. Participants will also be examined for their attitudes towards the training through post-test interviews and we expect positive feedbacks from participants.

3. Method

3.1 Participants

Twenty MCI patients living in nursing homes will be selected. The experiment is planned by following an approach called within-subjects design (WSD).

3.2 Material

3.2.1 Public figures
We collected photos of famous Japanese, who give us positive impressions. Selected public figures are supposed not to be familiar with participants. Eventually, no less than 40 public figures are employed as memory targets, and are categorized into four groups, each group of which contains at least ten figures. Two groups are used as materials for EL training and two other groups are used as materials for training under EF condition. The photos are printed on films to produce masks with *MIMAKI UJF-3042HG* printer (Figure 1) and *Forming 690* Forming Machine (Figure 2).

The masks are used for our experiment of memory where subjects are asked to associate a face with a name. The faces of public figures are used as clues to remember names as target.
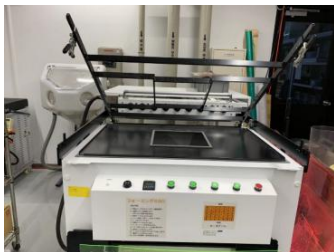

Figure 1. MIMAKI UJF-3042HG

Figure 2. Forming 690

3.2.2 Judgement of Learning (JoL)
JoL is composed of a question and scoring standard that taken from Akhtar et al.'s(2006) design. In this session, participants will be asked to evaluate their own performance by valuing it with a numeric figure, from 0% to 100%, where 0% means unlikely while 100% is likely to apply for their judgment. Their evaluations will be kept for further reference.

3.2.3 Post-test interview
The questions for the post-test interview are about the evaluation of this experiment. The questions are typically "Please briefly talk about your views on this cognitive training", "Do you think it is fun or boring?", "Do you think you can benefit from it?". We also ask them whether they prefer EL or EF training.

3.3 Procedure

Each presentation is a trial. A learning task consists of 10 trials. Participants perform a task every day. The entire learning process takes 4 days, in which EF and EL tasks are performed alternately every other day. Each task takes about 60 to 90 minutes.

3.3.1 Presenting Targets
The experimenter wears a mask of public figure in the presenting session and appears in front of the participants. Under the FL condition, participants are directly informed of the name of public figure, where the experimenter says "Hello, look at me, I'm Saburo Kitazima (a instance of public figure)", for example. Under the EF condition, participants are encouraged to guess the name of person, where the experimenter says "Hello, look at me, do you know who I am?", for example. The associated face is shown in Figure 3. Participant are informed of the correct answer if they fail to guess three times who he is.

Figure 3. The face of Saburo Kitazima as mask

3.3.2 Learning
Participants are asked to write down a name on a sheet of paper and to turn it over in case they see it again after each time they are presented a face to associate it with a name.

3.3.3 Judgement of Learning (JoL)
After each trial, participants are invited for self-evaluation about learning effect.

3.3.4 Cued recall
After each daily task, participants take a cued recall immediately, which represents the learning effect of that day. Participants are

presented ten masks, each of which depicts a public figure in this task and invited to write names of people whose faces are depicted with these masks. Participants are not forced to make a guess when it is difficult for them to remember a name.

4. Data collection

Data are collected the following way. Firstly, collect participants' JoLs in each trial. Secondly, collect the cued recall accuracy that are calculated after each training task. Finally, collect post-test interviews of self-evaluation, which are regarding participants' attitude towards this experiment .

5. Discussion

5.1 Expected results

We expect that collected data will allow us to observe training effects of this experiment. Firstly, the accuracy of cued recalling task indicates the effect of training on the day, which is measured by increased degree of associations between faces and names. The accuracy is also considered to represent the prime effect of training. The accuracy under EL condition is expected significantly better than that under EF condition. Secondly, the judgement of learning (JoL) is a self-report by participants, which shows the effect of self-evaluation of training. This result is combined with accuracy of cued recalling task and we analyze whether the self-evaluation is consistent with actual effects. JoL is also considered in discussing whether the participants themselves are convinced of the effects they have experienced in the training. We expect that participants will report that they consider their performance improved better under EL condition than under EF condition. If both accuracy and self-evaluation under FL condition is significantly better than under EF, then the new materials employed in this experiment can be considered to have led to similar effects of training as reported by Akhtar et al.'s(2006) .

The outcome from the post-test interview is expected to be promising because the contents in this evaluation are around engagement of training, and a positive feedback indicates that the employed training materials are attractive to participants.

5.2 Limitation

The present experiment is based on within-subject design (WSD), namely, participants take part in both EL and EF trainings alternately. Therefore, the interference may happen on training effects across two conditions if extensive training effects migrate from one to the other. For instance, assume that participants are trained by EL method on the first and the third day while they are trained by EF method on the second and fourth day. The effect observed on the fourth day may be due to the EL method carried out in preceding days. A similar issue also exists in the study by Akhtar et al.'s(2006), which is mainly caused due to the characteristics of WSD. Between-subject design (BSD) may solve the above issue by employing two groups of participants that correspond to different conditions respectively, say, EL and EF in this case.

Furthermore, BSD may also solve the baseline issue by employing two groups that correspond to different material conditions like between masks and pictures, letters or other traditional presenting way, which is not discussed in this study. Therefore, we cannot conclude whether the effect of training using

public figures masks is better than the other training carried out under the same conditions except of materials. This study can be extended in future to study the long-term effects of mobility if collected data support our hypothesis and if trainee can improve their memory for the face-name association task through the training method explained above.

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