Consciousness and Cognition 45 (2016) 100–108

Contents lists available at ScienceDirect

Consciousness and Cognition

journal homepage: www.elsevier.com/locate/concog

The effect of the feeling of resolution and recognition performance on the revelation effect

Hiroshi Miura [a,*], Yuji Itoh [b]

[a] Keio Advanced Research Centers, Keio University, Japan
[b] Faculty of Letters, Keio University, Japan

ARTICLE INFO

Article history:
Received 26 February 2016
Revised 6 August 2016
Accepted 10 August 2016

Keywords:
Memory
Recognition judgment
Criterion shift
Familiarity
Cognitive process

ABSTRACT

The fact that engaging in a cognitive task before a recognition task increases the probability of "old" responses is known as the revelation effect. We used several cognitive tasks to examine whether the feeling of resolution, a key construct of the occurrence mechanism of the revelation effect, is related to the occurrence of the revelation effect. The results show that the revelation effect was not caused by a visual search task, which elicited the feeling of resolution, but caused by an unsolvable anagram task and an articulatory suppression task, which did not elicit the feeling of resolution. These results suggest that the revelation effect is not related to the feeling of resolution. Moreover, the revelation effect was likely to occur in participants who performed poorly on the recognition task. The result suggests that the revelation effect is inclined to occur when people depend more on familiarity than on recollection process.

1. Introduction

The revelation effect is a mysterious effect whereby engaging in a cognitive task before making a recognition judgment increases the probability of "old" responses. The effect is similar to the priming effect in that a preceding stimulus affects the processing of a subsequent stimulus. However, the revelation effect is different from the priming effect in that the revelation effect occurs even if a preceding stimulus is not perceptually or semantically related to the subsequent stimulus (for an example, see Niewiadomski & Hockley, 2001).

Watkins and Peynircioğlu (1990) first demonstrated that the revelation effect is caused by a number of cognitive tasks, such as a revealed task (e.g., -l----n-, -l-p--n-, -l-p--nt, el-p--nt, el-p-ant, el-phant, elephant), an anagram task, a letters-rotated task, and a word-rotated task. They showed that the rate of old responses to the recognition probes preceded by the cognitive task was higher than that to recognition probes not preceded by the task. Moreover, they found that the revelation effect increased old responses, not only to the words in the study list, but also to words absent from the study list. In other words, the revelation effect raised not only the hit rate in response to test stimuli, but also the false alarm rate.

Other researchers have also confirmed the revelation effect (LeCompte, 1995; Luo, 1993; Peynircioğlu & Tekcan, 1993). In these studies, the actual test stimulus was used in the preceding cognitive task, as in the study by Watkins and Peynircioğlu (1990). For example, participants made a recognition judgment about the word "elephant" following a revealed task using the word "elephant." However, Westerman and Greene (1996) showed that the revelation effect also occurred when a test

* Corresponding author at: Keio Advanced Research Centers, Keio University, 2-15-45, Mita, Minato-ku, Tokyo 108-8345, Japan.
E-mail address: hiroshi9@f7.dion.ne.jp (H. Miura).

http://dx.doi.org/10.1016/j.concog.2016.08.002
1053-8100/

stimulus was preceded by an unrelated cognitive task. For example, participants made a recognition judgment of the word "elephant" following an anagram using the word "vineyard." Therefore, it is thought that there are two types of revelation effect (Verde & Rotello, 2004). We call one type of revelation effect the "direct effect," which occurs when the actual test stimulus is used as the preceding cognitive task. The other type of revelation effect is the "indirect effect," which occurs when a test stimulus is preceded by an unrelated cognitive task. The indirect effect occurs even when a cognitive task is not perceptually or semantically related to the test task, unlike the direct effect, which can be thought of as a type of direct priming. Because the mechanism of the indirect effect seems more mysterious than that of the direct effect, we chose to investigate the indirect effect in this study.

After Westerman and Greene (1996) showed the indirect effect, the effect was confirmed using various inserted tasks: memory span tests, synonym-generation tasks, letter-counting tasks (Westerman & Greene, 1998), revealed tasks (Bornstein & Neely, 2001; Westerman & Greene, 1998), numerical addition tasks (Leynes, Landau, Walker, & Addante, 2005; Niewiadomski & Hockley, 2001), tasks of determining attractiveness ratings for inverted faces (Bornstein & Wilson, 2004), and anagram tasks (Azimian-Faridani & Wilding, 2004; Bernstein, Rudd, Erdfelder, Godfrey, & Loftus, 2009; Bernstein, Whittlesea, & Loftus, 2002; Cameron & Hockley, 2000; Hockley & Niewiadomski, 2001; Kronlund & Bernstein, 2006; Major & Hockley, 2007; Niewiadomski & Hockley, 2001; Verde & Rotello, 2003, 2004; Westerman, 2000; Young, Peynircioğlu, & Hohman, 2009). The revelation effect has been shown to be caused by various inserted tasks; in fact, there are few tasks that have not been found to cause the effect. Westerman and Greene (1998) reported that numerical addition tasks and digit span tests did not cause the revelation effect, but Niewiadomski and Hockley (2001) later showed that the revelation effect was indeed caused by numerical addition tasks. Considering that few inserted tasks were found not to cause the revelation effect, it is necessary to clarify which tasks cause the revelation effect and which tasks do not. The discovery of tasks that do not cause the revelation effect may help to elucidate the mechanism of the revelation effect.

One of the most important goals in the study of the revelation effect is to reveal its mechanism. There seems to be no reason why inserted tasks should increase the probability of old responses from recognition tasks, as recognition tasks are unrelated to inserted tasks. Therefore, clarifying the mechanism of occurrence of the revelation effect may lead to the discovery of a new cognitive process relating to human memory. However, the occurrence condition of the revelation effect is not completely clear and studies show mixed results. For example, Prull, Light, Collett, and Kennison (1998) found that the revelation effect did not occur with elderly participants, while results by Thapar and Sniezek (2008) indicate that the effect did occur for elderly participants. Accordingly, the revelation effect occurrence condition is unclear, especially when dealing with individual differences. Moreover, these two studies dealt with the direct effect, and no studies have been carried out of the indirect effect, paying attention to individual differences. As a result, the effect of individual differences on the indirect effect is unclear. It may be important to pay more attention to the individual differences of the indirect effect.

The dual-process theory (Jacoby & Dallas, 1981; Mandler, 1980) has long been used to explain the revelation effect. According to the theory, people make recognition judgments based on two processes. One is "recollection," which is detailed, explicit memory for the study context. The other is "familiarity," which is the feeling of oldness. If the recollection process is not available, people are likely to depend on the familiarity process. Westerman (2000) reported that the revelation effect occurred when people made recognition judgments depending not on recollection processes but on familiarity processes. The study showed that the revelation effect did not occur in plurality recognition tasks or associative-recognition tasks using paired words, which require recollection. Whereas Westerman (2000) dealt with the indirect effect, some other studies have discussed the relationship between the dual-process theory and the direct effects of the revelation effect. For example, Landau (2001) found that the shorter the encoding time, or the longer the delay between the study phase and the test phase, the larger the revelation effect was. This is because people are more likely to depend on familiarity processes when their memory traces have declined. Considering these studies, it can be thought that the worse an individual's recognition performance is, the larger the rate or magnitude of the revelation effect. However, the relationship between the revelation effect and recognition performance has not been completely elucidated, especially concerning the indirect effect. As recognition performance can be rendered as a form of individual difference, investigating the relation between recognition performance and occurrence of the revelation effect may clarify the influence of individual differences on the revelation effect.

As described above, dual process theory has been broadly discussed in studies of the revelation effect. However, while dual process theory suggests which cognitive processes induce the revelation effect, it does not explain the "occurrence mechanism" of the effect. Therefore, to explain the occurrence mechanism, another theory, discrepancy attribution theory, was proposed by Whittlesea and Williams (2001a). They argued the following: people process a recognition task more fluently than a cognitive task, which is presented immediately before the recognition task, because the cognitive task is presented in a distorted form. However, people do not notice the exact reasons for their fluency, so a discrepancy between actual and expected fluency arises. The surprising fluency elicited by the discrepancy is misattributed to familiarity with the recognition word, so the revelation effect occurs. Various other discrepancies can also elicit familiarity (Whittlesea & Williams, 1998, 2000, 2001a, 2001b). Considering this, Kronlund and Bernstein (2006) claimed that the experience of a surprising feeling of resolution elicited by solving a cognitive task was misattributed to, and caused, the revelation effect. This surprising feeling of resolution might be generated by the discrepancy between the state in which the cognitive task was not yet solved and the state in which it had already been solved. Therefore, investigating the relation between the surprising feeling of resolution and the revelation effect may lead an understanding of the mechanism of the revelation effect.

The surprising feeling of resolution has two components: one is the "surprising feeling," the other is the "feeling of resolution." Therefore, we should treat the components separately to reveal the relation between the surprising feeling of