



# Contextual information influences the feeling of knowing in episodic memory



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## ARTICLE INFO

### Article history:

Received 6 December 2013

Available online 1 October 2014

### Keywords:

Feeling of knowing

Metamemory

Accessibility hypothesis

Noncriterial-recollection hypothesis

Memory

## ABSTRACT

The feeling of knowing (FOK) predicts the likelihood of eventually recognizing currently unrecalled items. Koriat (1993, 1995) showed that retrieval of partial target information influences FOK ratings. Building on Koriat's view, the noncriterial-recollection hypothesis contends that contextual information influences FOKs (Brewer, Marsh, Clark-Foos, & Meeks, 2010). Our study assessed the validity of the noncriterial-recollection hypothesis by controlling the amount of potentially-retrievable contextual information presented to participants. We varied the amount of contextual information accompanying the name and image of imaginary animals. There were three information conditions: minimum (name and image), medium (name, image, and country), and maximum (name, image, country, diet and weight). Information condition did not affect recall accuracy. The minimum condition resulted in greater response output (recall and commission errors together). FOKs for unrecalled items were lower in the minimum condition than the other conditions. Consistent with the noncriterial-recollection hypothesis, FOKs were positively correlated with the retrieval of contextual information.

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## 1. Introduction

Feeling-of-knowing judgments (henceforth, FOKs) have been a mainstay of metamemory research since its inception to the present (Hart, 1965; Hertzog, Fulton, Sinclair, & Dunlosky, 2014; Thomas, Bulevich, & Dubois, 2011). A FOK is a prediction of the likelihood in future of recognizing a currently unrecalled item with respect to both semantic and episodic memory. For example, a person may not be able to recall the capital of Montenegro successfully, but can predict whether or not he or she will be able to recognize the capital (Podgorica) from a list of other European capitals. As regards episodic memory, a participant may encode a word pair (e.g., “captain-carbon”), and later the cue word is provided and the target word must be recalled. When recall fails, FOK judgments predict the likelihood of recognizing that target (Hertzog et al., 2014; Metcalfe, Schwartz, & Joaquim, 1993).

FOKs are typically measured using Hart's recall–judgment–recognition procedure (Hart, 1965, 1966, 1967), which involves asking participants to recall the answer to a question, followed by a feeling-of-knowing judgment and then a recognition test. The recall–judgment–recognition procedure can be applied to both semantic and episodic memory. FOKs can be applied to semantic memory by means of a general-information question. They can address episodic memory, for example, by providing one part of a newly learned cue–target pair and asking for the other. With both episodic and semantic

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memory, if participants cannot recall the target answer, they are asked for a FOK, which can be given on either a Likert scale or a percentage scale (i.e., 0–100). Researchers can introduce variables that affect the magnitude of the FOK judgments. For example, recalling attributes of the target stimulus leads to larger magnitude FOK judgments (Thomas, Bulevich, & Dubois, 2012; Thomas et al., 2011). FOK accuracy is then assessed by means of a recognition test, and the FOK ratings are correlated with the likelihood of recognizing the target answer. Typically, researchers then use gamma correlations to examine the correlation between the FOK and subsequent recognition (Nelson, 1984; but see Benjamin & Diaz, 2008; Masson & Rotello, 2009). In normal participants, the subjective judgments are an accurate prediction of memory performance (Metcalfe et al., 1993; Nelson, 1984; Thomas et al., 2011). It is, of course, an intriguing thought that participants can accurately predict what they do or do not know when their memory fails them. What we are interested in here is what causes FOKs to increase or decrease, that is, the magnitude of FOKs.

Koriat (1993, 1995) proposed that the mechanism underlying FOKs is the accessibility of partial target information. In Koriat's view, FOK estimations do not rely directly on a stored but inaccessible target item. Rather, participants retrieve only parts of the target (e.g., first letter, or number of syllables). Based on the information retrieved, participants make an unconscious inference as to whether or not the whole target is stored in memory as well. According to the accessibility model, the tendency to produce a high or low FOK depends on the total amount of partial information elicited by the question for a given individual.

At present, there are much data to support the Koriat (1993) model. For example, his own experiments involved presenting participants with four-letter combinations of consonants, such as JZST, which they were later asked to recall as best they could. Each individual letter constituted an item of partial information, contributing to the target answer, which consisted of the entire string of letters. Participants were asked to recall the target of parts of it, and they could produce from 1 to 4 letters of the target string. They then gave an FOK for subsequent recognition of the complete letter string if they could only recall part of it. Koriat observed that when participants recalled 1, 2, 3, or 4 of the letters, their FOK was higher than when they had no partial recall. Using a methodology similar to Koriat's (1993), the validity of the accessibility model for FOKs was also demonstrated in pharmacologically-induced amnesia (Izaute & Bacon, 2006) and in schizophrenia patients (Bacon & Izaute, 2009). Koriat (1995) found that partial information (letters, syllables, etc.) also predicted FOKs when general-information questions were used, that is, in a task assessing semantic memory. It is also worth noting that Koriat (1995) also speculated that non-target contextual information would influence FOKs. In another study, Schacter and Worling (1985) found that FOKs were higher when participants could recall the emotional valence (good or bad) of an unrecalled word. To summarize, participants use partial information retrieved about the unrecalled target to determine their FOK.

Koriat's view was expanded upon by Brewer, Marsh, Clark-Foos, and Meeks (2010). Brewer et al. proposed the noncriterial-recollection hypothesis. First, it is important to note that the noncriterial-recollection hypothesis does not contradict the accessibility view, nor are the two mutually exclusive. Rather, according to the noncriterial-recollection hypothesis, FOKs may be influenced by the retrieval of other information from the encoding context. Contextual information can be any information present at encoding that is not specifically target information. Thus, it may be related information, such as the part of speech of the target word, it may relate to the participant's emotional state at encoding, or, as tested here, it may be information associated with, but not identical to the target. Take, for example, the case of being asked whether or not you know the capital of Montenegro. According to Koriat's original view, being able to retrieve the first letter of Podgorica may drive a participant's FOK as regards the capital of Montenegro. According to the noncriterial-recollection hypothesis, retrieving other contextual information about Montenegro (e.g., that the professional basketball player Nikola Vučević comes from Montenegro) may also reinforce the FOK.

To be clear on terminology, "partial target information" is defined as information relating to the target word alone. Thus, if the target word is "Podgorica," partial information includes the first letter of the word, the number of syllables, the last letter, and partial retrieval of certain syllables ("pod"). Contextual information is any information relating in any way to the target, but not actually referring to it. Thus, in the case of Podgorica, contextual information may include its status as the largest city in Montenegro, its proximity to Lake Scutari, and its brief history as Titograd. Of course, there may be situations in which it can be hard to distinguish between partial and contextual information. For example, if the target word is "pulchritude," retrieving the affective valence of the word could be considered either partial or contextual. However, for the purposes of this experiment, contextual information will be clearly differentiated from partial information about the target itself.

The noncriterial-recollection hypothesis is backed up by several studies that correlated retrieved contextual information with the magnitude of FOK judgments. Brewer et al. (2010) found a correlation between the accurate retrieval of source information and the magnitude of FOKs. Hoseney, Peynircioğlu, and Rabinovitz (2009) interviewed people about the reasons for their FOKs and found that people self-reported using retrieved information to determine their FOK. In other words, when participants could remember the profession associated with a famous face, they were more likely to give a high FOK. In another study, Thomas et al. (2011) used valenced paired-associate stimuli and found that successful valence retrieval produced higher FOKs, among both younger and older adults. Thomas et al. (2011) showed that there was a positive correlation between retrieved valence information and higher FOKs. It is unclear whether the valence of a target should be considered partial or contextual information – it straddles the boundaries between the two. Nonetheless, Thomas et al. (2012) showed that there was a correlation between the retrieval of conceptual target features, such as whether the target was in same category as the cue, and the magnitude of the FOKs. In addition, they found that not only retrieval of the target font, but also the accuracy of such retrieval likewise correlated with the magnitude of the FOKs. Finally, Hertzog et al. (2014) correlated the

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