

The Strategic Control of Retrieval during Tip-of-the-tongue States

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The tip-of-the-tongue state (TOT) is the phenomenological experience that a word is on the verge of being recalled. This study adapted the Nelson-Narens (1990) model to examine TOTs' role in the strategic control of retrieval. It was hypothesized that TOTs would predict retrieval strategy decisions. Following failures to recall targets to general-information questions, participants made TOT judgments and decisions concerning retrieval strategies. In the metacognitive control condition (MCC), participants chose retrieval strategies for each target. Participants chose to direct search immediately, to delay search, or to see the answer (i.e., consultation). In the no-control condition (NCC), strategies were assigned randomly for each target. The results showed that more decisions were made to search when in TOTs than when not in TOTs. In line with metacognitive theory, more TOTs, but not "don't know" items, were resolved (eventually recalled) in the MCC condition than in the NCC condition.

Tip-of-the-tongue states (TOTs) are reported by most people on a common basis (A. Brown, 1991; Reason & Lucas, 1984). To the rememberer, a TOT is a strong feeling that a particular target word can be retrieved, and the feeling that the retrieval of that target is imminent. To date, studies have shown that TOTs are correlated with indices of memory such as retrieval of the first letter, the number of syllables, grammatical gender, synonyms, homonyms, or semantically-related information (A. Brown, 1991; R. Brown & McNeill, 1966; Brennan, Baguley, Bright, & Bruce, 1990; Koriat & Lieblich, 1974; Metcalfe, Schwartz, & Joaquim, 1993; Miozzo & Caramazza, 1997; Perfect & Hanley, 1992; Schwartz, 1999; Vigliocco, Antonini, & Garrett, 1997). Although many studies have linked TOTs to lexical retrieval, there are only a few studies that attempt to relate TOTs to behaviors that people engage in to control retrieval (see Gardiner, Craik, & Bleasdale, 1973; Ryan, Petty, & Wenzlaff, 1982; Schwartz, 2001, for exceptions). The current study was designed to address if TOTs support to control strategic aspects of retrieval.

Nelson and Naren's (1990; 1994) model of metacognition is used in this paper. In the model, metacognition works by communication between a monitoring system, which observes ongoing cognition and a control system, which can alter the ongoing cognitive processes. Monitoring must be accurate to allow control to be effective. Metacognitive control refers to the processes whereby rememberers use the output of monitoring systems to regulate or change cognitive processes or behavior (e.g.,

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Mazzoni & Cornoldi, 1993; Nelson & Narens, 1990, 1994; Nelson, 1996; Schwartz, 2001). Metacognitive control is a form of self-regulation because the person uses feedback from one system to affect change in another (Nelson, 1996).

Control processes appear to be an important component of metacognitive systems. For example, Mazzoni and Cornoldi (1993) found a negative correlation between judgments of learning and study time, suggesting that participants devote more study time to those items that they consider to be difficult. Thiede and Dunlosky (1999) showed that judgments of learning also predicted the selection of items for restudy (also see Son & Metcalfe, 2000). Koriat and Goldsmith (1996) found that with high incentives for accuracy, participants could successfully screen out answers as incorrect that they had earlier made under forced-report conditions. Nelson, Gerler, and Narens (1984) showed that feeling-of-knowing judgments were correlated with longer retrieval latencies, suggesting that the experience of a feeling of knowing may initiate longer retrievals (also see Schwartz, 2001). Gardiner et al. (1973) found that TOTs for the answers to cued recall questions lead to better free recall of those answers, suggesting that TOTs highlight a difficult retrieval and make it more accessible in the future.

Resolution of TOTs During a TOT, a rememberer feels on the verge of recalling a currently unretrieved target. The term resolution refers to the eventual recall of an originally unretrieved target. Many studies have documented higher resolution for TOTs than for n-TOTs (those items not retrieved for which there is no TOT feeling) (see A. Brown, 1991; Schwartz, 1999; Smith, 1994 for reviews). A correlation between TOTs and resolution does not mean that TOTs cause us to resolve items, nor does it imply that TOTs direct retrieval during resolution. Evidence, however, does suggest this to be the case. For example, Schwartz (2001) found that TOTs were associated with longer retrieval latencies, suggesting that the TOT induced people to search longer for some targets, which resulted in more resolution. In the current study, the question will be asked if TOTs allow us to control more sophisticated retrieval strategies.

In everyday life, how do people resolve TOTs? A series of diary studies of naturally-occurring TOTs reveal some interesting characteristics of TOT resolution (Burke, MacKay, Worthley, & Wade, 1991, Heine, Ober, & Shenaut, 1999, Reason & Lucas, 1984; Schwartz, in press). In each of these studies, TOTs are resolved in one of three ways. First, a large percentage of TOTs are resolved via spontaneous resolution or "pop-out". Spontaneous resolutions occur when the rememberer is no longer thinking about a particular TOT target, but the target suddenly appears without conscious search. Schwartz (in press) found that, with young adults, 42% of resolved TOTs occurred via spontaneous resolution. Spontaneous resolutions are an increasingly common method of TOT resolution among older adults than among younger adults (Burke et al., 1991; Heine et al., 1999). Second, a significant, but smaller, percentage of TOTs are resolved via directed search. Directed search involves a deliberate mnemonic effort on the part of the rememberer with the aim of retrieving a TOT target. Directed search may vary from continuing to contemplate the question to mnemonic strategies, such as first-letter cueing. Third, some TOTs are resolved via consultation, that is, by checking with outside sources, such as other people, dictionaries, or a thesaurus. As consultation does not involve specific mnemonic behavior, it is less of interest as a retrieval strategy.

The diary studies, however, do not indicate how rememberers choose one strategy or another. Is the selection of a resolution strategy merely a random guess, or is it a

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1994; Nelson, 1996; Schwartz, et al., 1999) because the person uses a tip of the tongue state (Nelson, 1996).

function of metacognitive systems. There is a negative correlation between the amount of study time participants devote to a word and whether they retrieve it. Thiede and Dunlosky (1999) found that with high selection of items for restudy, participants with high resolution screen out answers as incorrect more often. Nelson, Gerler, and Narens (1999) found that resolution correlated with longer retrieval times. Thiede and Dunlosky (1999) found that TOTs for the first of those answers, suggesting they are more accessible in the future.

Participants on the verge of recalling a word are more likely to resolve it to the eventual recall of an item than those who have documented higher resolution for items (e.g., Nelson, 1996; Thiede & Dunlosky, 1999) which there is no TOT feeling (e.g., Nelson, 1996; Thiede & Dunlosky, 1999) (see Nelson, 1996, for reviews). A correlation between resolution and TOTs cause us to resolve items, not to recall them. Evidence, however, does not support this. Nelson (2001) found that TOTs were not related to resolution. In the current study, participants with more sophisticated retrieval

strategies of diary studies of naturally occurring TOT resolution (Burke, Gollwitzer, & Meenaut, 1999; Reason & Lucas, 1996) are resolved in one of three ways: via spontaneous resolution or directed search. Spontaneous resolution occurs when a word appears without conscious search. Directed search occurs when a word appears after an increasingly common method of resolution (Burke et al., 1991; Nelson, 1996). Percentage of TOTs are resolved via spontaneous resolution, directed search, or mnemonic effort on the part of the participant. Directed search may vary in its specificity, such as first-letter search, that is, by checking with a thesaurus. As consultation does not require a retrieval strategy.

Participants choose one strategy or another: a random guess, or is it a

deliberate choice on the part of the rememberer? If it is a deliberate choice of the rememberer, then it is possible to view the TOT from the perspective of metacognitive control. A TOT may be a marker that one strategy or another may be a better method to resolve that particular unretrieved target. If TOTs do serve a control function, it is also possible to ask if the function is useful or accurate. Thus, do TOTs assist one in making good retrieval strategy decisions? In particular, when people make decisions to search now or delay until later in hope of a spontaneous recovery, does their overall resolution improve?

The current study was designed to ascertain if participants know when it is more adaptive to continue to search immediately despite the inaccessibility of the word and when it makes more sense to wait for a spontaneous recovery. Based on the assumption that TOTs are as metacognitive judgments, they should serve a role in both monitoring and control (e.g., Nelson, 1996; Schwartz, 2001). In order to study this question, two conditions were designed. In the first condition the, metacognitive control condition (MCC), participants had the freedom to choose an appropriate retrieval strategy on an item by item basis. In a comparison condition, the no-control condition (NCC), the freedom to choose is removed and retrieval strategy is determined randomly for each item. The specific hypothesis advanced here is that when rememberers have control over their retrieval decisions, they will show better resolution of unrecalled targets than when strategies are determined randomly. Furthermore, the hypothesis is that this effect will only occur for TOTs because TOTs are loaded with metacognitive information that allows rememberers to make these decisions. Finally, the hypothesis, following the diary studies, is that spontaneous resolution will be the most successful method of resolving TOTs. To foreshadow the results, the first two hypotheses received substantial support, but the third was not supported.

METHOD

Participants The participants were 84 Florida International University students who received partial course credit for their participation. Each participant was tested individually on a Macintosh computer during a session that lasted approximately one hour. There were 38 participants in the metacognitive control condition (MCC) and 46 participants in the no-control condition (NCC).

Materials The stimuli for the experiment were 80 general-information questions taken from the Nelson-Narens norms (Nelson & Narens, 1980). For example, one question was "For which country is the rupee the monetary unit? (India)" Previous testing indicated that the 80 questions generated a correct percent rate of around 36% (with a range from 0% to 80%) in the student population tested (Schwartz, 1998; 2001; Schwartz, Travis, Castro, & Smith, 2000). The list of items was randomized for each participant.

Procedure Participants were first given detailed instructions about the procedure. They were told that they would be answering a series of general-information questions, some of which would be easy and some of which would be more difficult. They were given an explanation of what the term "tip of the tongue" meant. All participants reported being familiar with the experience and with the term. The instructions were as follows,

"If you do not answer the question correctly or leave the answer blank, you will be asked whether or not you are in a tip-of-the-tongue state for the target answer. A tip-of-the-tongue state (abbreviated TOT) means that you feel as if it is possible that you could recall the target answer, and that you feel as if its recall is imminent. If you are in a TOT state, indicate a TOT, by pressing the Y key. If you cannot recall the answer and are not in a TOT state, press the N key."

This was explained first by the experimenter and then was repeated on the computer just before the experiment began. In the NCC, they were told that for each question, they would be given either an opportunity to resume search (directed search), to delay retrieval until later (simulating spontaneous resolution), or to see the answer immediately (simulating consultation). They were told that these options would be assigned by the computer. Participants in the NCC were instructed that the three participants who recalled the most targets would receive a small (5\$ American) monetary award. In the MCC, they were told that for each unretrieved target, they would be required to make a decision about how best to remember it. They were also given the following instructions, "If you cannot recall the correct target or if your guess is incorrect you will have three choices. You can view the correct answer right away. You can elect to spend more time trying to remember the answer right away. Or you can elect to return to that question later after all the other questions have been presented. Keep in mind, that seeing the answer now means you will not be able to recall it yourself. And there is a prize for those participants who remember themselves the most answers." The instructions for the award were the same as in the NCC condition. Subsequently, the three individuals with the highest recall score were awarded five dollars from the experimenter in each condition.

The experimenter then started the computer program that ran the experiment. Participants were instructed to go through the questions at a pace that was comfortable for them. No instructions were given to go either fast or slow.

Each question appeared on the middle of the screen, and a prompt appeared beneath the question. The question remained on the screen until the participants typed in their responses. Participants typed in their responses, or they indicated that they did not know by typing in a question mark. If the participant typed in the correct response, they simply moved on to the next question. If they indicated that they did not know (omission error) or answered incorrectly (commission error) (i. e., Krinsky & Nelson, 1985), they were asked whether or not they were in a TOT. Participants were told in advance that if they were asked about a TOT after they had typed in a response, that the response was either incorrect or misspelled. Participants typed in a "Y" if they were experiencing a TOT, and an "N" if they were not.

If they had not recalled the answer and were in the MCC condition, a prompt occurred to ask them if they wanted to engage in directed search now, delay retrieval, or see the answer now. The participants indicated their selection by pressing the numerals, 1, 2, or 3 respectively. If they had selected to search now (directed search), the question re-appeared on the screen and the participants had the option of reporting a new response. If they selected to see the answer (consultation), the correct answer appeared on the screen for ten seconds. If they choose to return later (delayed search), the next question appeared on the screen. If the participant was in the NCC condition, they did not receive a prompt to select a strategy. Rather, the computer randomly choose one of the three options. Otherwise, this stage was identical to the MCC condition. After participants attempted retrieval for all 80 questions and made TOT

judgments for those that they choose to delay opportunity to recall the

Finally, the participants were given a final response shown the question for (Wilkinson & Nelson) typed in the number were then presented with questions. At the end credit in their introduction

Procedures for analysis experiments, as adjusted here (Stevens, 1986). variables were not examination interaction analyses. The degrees did not make comparisons. Generally, TOT judgments which participants indicated were also elicited after between TOTs after both (see Schwartz, significant omnibus F were used.

Recall Correct recall with earlier findings. There was no difference condition ($F < 1$). The computer program catch all misspellings removed post-experiment (this experiment). Misspellings

TOT rates and accuracy This is high relative to has been found with Schwartz et al., 2000 strategy selected. Participants (36%) than in the NCC showed a differential = 68.2, MSE = .02. To see the correct answer or directed searched in MCC condition because

