

# Tip-of-the-tongue states as metacognition

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**Abstract** The tip-of-the-tongue state (henceforth, TOT) is typically defined as the feeling that a known word will be recalled even though it is not accessible immediately. Others have defined TOTs as simply the state of temporary inaccessibility (cognitive state) rather than the feeling of temporary inaccessibility (metacognitive experience). I argue that TOTs are metacognitive experiences rather than cognitive states. I present several lines of evidence to support this from the existing literature. In addition, I present evidence to support a distinction between TOTs and feelings of knowing (FOK). Although there is no definitive data, several lines of research support that TOTs and FOKs, although similar, are partially produced by different processes. Indeed, recent neuroimaging data show that different areas of the brain may be involved in TOTs and FOKs.

**Keywords** metacognition · tip-of-the-tongue states · feeling of knowing · memory retrieval

“I would say that the TOT *is* the label we apply when a person reports partial aspects of the target. If there is any excess meaning of TOT beyond that, I do not know what it is.” Nelson, 2000. p. 220.

For Nelson (2000), the term tip-of-the-tongue state (henceforth, TOT) meant the cognitive state in which a person is able to report partial phonological or semantic information about a target item, but cannot retrieve the entire word. Nelson (2000) reserved the term “feeling of knowing” to refer to the phenomenological experience that informs us that a word is temporarily inaccessible. Some researchers, consistent with Nelson’s view (e.g., Hamberger & Seidel, 2003; Kikyo, Ohki, & Sekihara, 2001; Kohn et al., 1987; Vigliocco, Antonini, & Garrett, 1997), operationally defined TOTs strictly in terms of mnemonic performance without any metamemory

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component. That is, for these researchers, a TOT is a state of temporary inaccessibility of a stored item, regardless of whether or not the rememberer is aware of it. Indeed, these experiments do not ask participants if they are experiencing a TOT. Rather, it is inferred from their behavior (Hamberger & Seidel, 2003; Kikyo et al., 2001; Kohn et al., 1987; Vigliocco et al., 1997). However, most other researchers, following Brown and McNeill (1966), operationalize TOTs in terms of phenomenological experience of the rememberer (see Brown, 1991; Schwartz, 1999; Smith, 1994 for reviews). These researchers always collect self-reported TOTs from subjects. Recently, Bacon, Schwartz, Paire-Ficout, and Izaute (2006) refer to the inability to retrieve a known word as the “cognitive TOT” but refer to the feeling that an item will be retrieved as the “phenomenological TOT”. In this paper, I will argue, in contrast to Nelson’s (2000) view, that the TOT should be considered primarily a metacognitive judgment rather than a state of temporary inaccessibility. Thereafter, I will also make the case that TOTs are conceptually distinct and at least partially independent of the feeling-of-knowing judgment (FOK) which is often used in the metacognitive literature. First, I outline the role that TOTs have played in cognitive psychology.

TOTs play an important role in a number of areas within cognitive psychology, including theories of metacognition (e.g., Schwartz, 1999), memory (e.g., Brown, 1991; Smith, 1994), and lexical retrieval (e.g., Harley & Bown, 1998; Miozzo & Caramazza, 1997; Vigliocco et al., 1997). TOTs have been a topic of interest within cognitive psychology since the beginnings of cognitive psychology (e.g., Brown & McNeill, 1966) to contemporary researchers (e.g., Choi & Smith, 2005; Gollan & Acenas, 2004; Hamberger & Seidel, 2003; Lesk & Womble, 2004). In this paper, we approach TOTs as metacognitive judgments. Thus, like other metacognitive judgments, TOTs may not be perfectly accurate at predicting recall, but they are subjective states defined by individual rememberers and not by experimenters. Indeed, much of my work over the past few years has used this metacognitive approach (e.g., Schwartz, 1998, 1999, 2001, 2002a, 2002b; Schwartz & Frazier, 2005; Schwartz & Smith, 1997; Schwartz, Travis, Castro, & Smith, 2000).

In the metacognitive view, TOTs are seen as an imperfect monitor of ongoing cognitive processes (Schwartz, 2002a). That is, TOTs are experiential feelings, which allow rememberers to monitor and control their retrieval processes (Schwartz, 1999, 2002a). In most metacognitive theories, the metacognitive monitor does not have direct access to the unretrieved target. Rather, the monitor uses a host of inferential means to infer retrievability (Koriat, 1993; Metcalfe, 1993; Metcalfe et al., 1993; Nelson, 1996; Schwartz, 1999). However, other theories postulate that TOTs directly monitor the unretrieved target (Brown & McNeill, 1966; Faust, Dimitrovsky, & Davidi, 1997; Kohn et al., 1987). My goal here is not to contrast inferential and direct access views of TOTs (see Schwartz, 1999, 2002a, 2002b for this discussion). Both the inferential and direct-access views are compatible with metacognitive approaches. The goal here is to argue that the term TOT should refer to the experience of inaccessibility rather than inaccessibility itself, as some have argued (e.g., Kikyo et al., 2001; Kohn et al., 1987; Vigliocco et al., 1997).

Those who prefer to think of TOTs as cognitive, not metacognitive, states of temporary inaccessibility tend to be interested in the process of lexical retrieval (Hamberger & Seidel, 2003; Kikyo et al., 2001; Kohn et al., 1987; Vigliocco et al., 1997). That is, a TOT is defined as a failure to retrieve known information followed by later partial information retrieval (Kohn et al., 1987; Vigliocco et al., 1997), or

successful recognition (Kikyo et al., 2001). For example, in Vigliocco et al's study, TOTs were assigned to all unretrieved targets for which the rememberer made partial information guesses. Positive TOTs were defined as those that were later recognized as correct, and negative TOTs were those in which the rememberer did not associate the target word with a hypothetical intended word. Although consistent with Nelson's (2000) view, this approach to TOTs is at odds with the dominant tradition in the field, starting with Brown and McNeill (1966) who, despite their interest in lexical retrieval, had participants tell them when those participants were in TOTs. Indeed, most of the work on TOTs and lexical retrieval relies on a metacognitive definition of the TOT (e.g., Gollan & Acenas, 2004; Lesk & Womble, 2004; Miozzo & Caramazza, 1997; Perfect & Hanley, 1992). In these studies, because of the strong correlation between TOTs and word knowledge, the subjective TOT is used as an opportunity to study retrieval when the process is slowed or halted (Kohn et al., 1987; Miozzo & Caramazza, 1997). Thus, there is no intrinsic contradiction between the use of TOTs to highlight theories of word retrieval and the use of metacognitive theory to explain TOTs. Rather, in this paper, I take Nelson's (2000) challenge and argue that TOTs are best defined as the feeling of temporary inaccessibility rather than the temporary inaccessibility itself.

### **Reasons to consider TOTs as metacognitive judgments**

Nelson (2000) argued that the term TOT should be reserved for the cognitive state in which a to-be-retrieved item was temporarily inaccessible. Feeling of knowing, Nelson argued is the term that refers to the feeling that a word that is temporarily inaccessible will be retrieved. Thus, Nelson did acknowledge that these two processes are potentially dissociable. However, I argue that Nelson erred in assigning the term TOT to refer only to temporary inaccessibility. In practice and in theory, it makes sense to assign the term TOT to the metacognitive state. I list and explain several reasons why I make this claim.

#### **1. *The term tip of the tongue is universal.***

I contend that the term "tip of the tongue," in everyday life, refers to the feeling of inaccessibility of a known item. That is, people use this expression to mean that they feel like they know the word, but cannot recall it at the moment, very close to its definition within cognitive psychology. To test this view of the TOT, I conducted an informal survey (Schwartz, 1999). I found native speakers of 51 different languages across the world. These 51 languages included Native American languages, native Australian languages, as well as a great many languages from the Indo-European language group. I found that in nearly 90% of the languages surveyed, the feeling of temporary inaccessibility was expressed in terms of the tip-of-the-tongue metaphor (Schwartz, 1999). I argued that this shows that the term refers to the experience of phenomenology that defines this feeling of temporary inaccessibility. If the "tongue" metaphor did not somehow capture the feeling, then the same metaphor would not be used in such disparate languages, many of which have little to no overlap in origin or history. Interesting, several west African languages as well as French (which also uses the "tongue" metaphor) expressed the feeling of temporary inaccessibility by calling it a "hole in the head." Despite these exceptions, I think the universality

of TOT terminology argues for the acknowledgement that the TOT refers to the metacognitive feeling of temporarily inaccessibility.

One anonymous reviewer pointed out that, given that temporary forgetting is likely a universal phenomenon, it is unclear if this argues for or against the view that TOTs should be considered metacognition. However, I argue that it is the metaphor itself that suggests phenomenology. If TOTs were not a universal subjective experience, the word for temporary inaccessibility would vary, focusing rather on aspects of forgetting rather than attributing a feeling to a particular part of the body. Nonetheless, neither the survey nor the conclusions are the result of experimental science, so this reason should be taken with a grain of salt.

2. *People can distinguish different experiential states within the TOT.*

People can distinguish between different phenomenological experiences within the TOT, and these differences predict performance (Schwartz et al., 2000). Schwartz et al. examined differences between emotional and non-emotional TOTs, strong and weak TOTs, and imminent and non-imminent TOTs. Each dichotomy led to different outcomes, and, in the case of imminence correlated differentially with later memory performance. Thus, people's subjective experience, which varied from TOT to TOT, predicted other measures. Moreover, people experience TOTs for illusory items, that is, questions for which there is no answer (Schwartz, 1998; Schwartz et al., 2000). Although it is possible to consider these TOTs for incorrect answers, the fact that real answers do not exist support the notion that the TOT is a feeling of inaccessibility rather than the inaccessibility itself.

3. *Studies show a correlation between TOTs and retrieval behavior.*

TOTs appear to be linked to control decisions by the person experiencing a TOT (see Schwartz, 2002a for a review). The standard model of metacognition argues that we monitor our cognitive processes, and then use the output of that monitor to make effective control decisions (Nelson, 1996). Thus, if TOTs are to be considered metacognitive judgments, we should expect to find some correlations between the likelihood of a TOT and some aspect of retrieval. This is the case for TOTs. First, Schwartz (2001) showed that TOTs were correlated with decision times to retrieve, that is, people spent more time trying to retrieve the answers when they were in a TOT than when they were not. Second, Schwartz (2002b) showed that TOTs were correlated with decisions concerning how to retrieve answers. In this study, participants were more likely to opt to continue search or return to an item later rather than have the answer provided for them when they were in a TOT than when they were not. Third, Litman, Hutchins, and Russon (2005) showed that TOTs were linked to curiosity. When in a TOT, participants were more willing to devote time and resources to finding an answer than when not in a TOT. Finally, Ryan et al. (1982) showed that performance on a secondary task was worse when participants were in a TOT than when not, suggesting they were still directing resources to resolving the TOT. These four studies all show that TOTs are potentially useful in metacognitive control. In particular, experiencing a TOT drives us to search harder.

4. *Variables that affect established metacognitive judgments also affect TOTs.*

Several studies have delineated some of the factors that affect FOK judgments.

Metcalf, Schwartz, and Joaquim (1993), for example, argued that cue familiarity was an important component in the magnitude of feeling of knowing judgments. They also showed that cue familiarity can influence TOTs (Metcalf et al., 1993; also see Schwartz & Smith, 1997), although it did not influence recall. Koriat (1993; 1995) showed that partial and related information influence FOK judgments. Similarly, Schwartz and Smith (1997) showed that the amount of related information presented (and retrieved) influenced the number of TOTs without affecting recall in a TOTimal paradigm. Thus, there are data that clearly show that factors, such as cue familiarity and the retrieval of related information affect the feeling of temporary inaccessibility without affecting temporary inaccessibility itself. We return shortly to the issue of how TOTs and FOKs relate to each other.

5. *Neuroimaging data is consistent with metacognition.*

Within the last few years, there have been several studies that have asked people if they are experiencing TOTs while being scanned in a fMRI (Maril, Simons, Weaver, & Schacter, 2005; Maril, Simon, Mitchell, Schwartz, & Schacter, 2003; Maril, Wagner, & Schacter, 2001). In these studies, it was shown that TOTs light up areas of the brain associated with monitoring and control and that the neural processes during the TOT is not identical to neural processes during retrieval itself (also see Kikyo et al., 2001). We will return to this topic later in the paper.

To summarize, I argue that the five reasons that I advance here bolster the claim that TOTs should be considered metacognitive judgments. The term should be used to refer to the feeling of temporary inaccessibility, not simply the state of temporary inaccessibility. In the next section, I will consider whether or not TOTs and FOKs should be considered identical judgments revealing the same underlying metacognitive properties or different judgments revealing at least some different metacognitive processes.

### **Do TOTs and FOKs tap different underlying metacognitive processes?**

Tip-of-the-tongue states are commonly defined as a feeling of imminent retrieval, that is, the tip-of-the-tongue state is a feeling that the item will be recalled and soon (Schwartz, 2002a). In contrast, the feeling-of-knowing judgment (FOK) is typically operationally defined as a feeling that one will be able to recognize—from a list of items—an item that is currently inaccessible (see Schwartz, 1994, 1999). Given the similarity of the definitions, it is likely that the two judgments capture many of the same underlying metacognitive processes. Indeed, it is reasonable to assume that the default parsimonious position that TOTs and FOKs are identical, or, at the very least, that TOTs are strong FOKs. However, following Bahrck (2005), it is fair to ask whether or not TOTs and FOKs capture identical underlying metacognitive processes. Here, I will argue that there are reasons to consider the two partially a result of different neurocognitive processes.

Unfortunately, there are few studies, which directly address this issue. Few studies have asked participants to make both FOKs and TOTS on the same to-be-remembered information in the same study, although I will shortly review those that do. Moreover, few studies have examined experimental variables with the idea of

examining if TOTs and FOKs are based on different processes. And those that do reveal mixed findings. Currently, work in a number of labs is addressing this issue, so a paper on TOTs in a few years may be able to answer this question.

Nonetheless, I will tentatively advance the position here that there are enough studies in the literature that suggest that TOTs and FOKs tap different processes to warrant a conclusion that the judgments do differ and in important ways (Maril et al., 2001, 2003, 2005; Schwartz et al., 2000; Widner, Smith, & Graziano, 1996; Widner, Otani, & Winkelman, 2005; Yaniv & Meyer, 1987). This is not to argue that they are completely independent nor to argue that these data are now conclusive. Rather, some data support the notion that there are variables that appear to affect TOTs and FOKs differently. Moreover, the neuroimaging data, as sensitive as it may be to different task variables, also suggests that TOTs and FOKs may tap some separate neural processes.

Having stated the hypothesis that TOTs and FOKs are potentially dissociable does not mean that the two judgments are not highly correlated and indeed caused by many of the same processes. Certainly some of the literature suggests a strong overlap between TOTs and FOKs. For example, Metcalfe et al. (1993) looked at the effects of cue familiarity and target memorability on both FOKs and TOTs. They found that both FOKs and TOTs were increased by cue familiarity but not target memorability. Thus these two variables affected the two judgments in identical ways. Moreover, although they did not report this aspect of the data in Metcalfe et al., they also found that all TOTs received FOK ratings of over 65%. This also suggests a strong correspondence between FOKs and TOTs. Similarly, Yaniv and Meyer (1987) asked participants to first report TOTs and then indicate FOKs. They found a median correlation of  $\gamma = 1$  between the two judgments (and a mean of 0.92). However, they did find some instances in which TOTs were given low FOKs, and in which n-TOTs (not recall and not given TOTs) were given high FOKs, potentially leaving open the possibility that FOKs and TOTs do tap different “introspective processes (p. 194).”

I now turn to the evidence that supports the view that TOTs and FOKs are potentially dissociable. Widner et al. (1996) looked at the effect of “demand characteristics” on TOTs and FOKs. To manipulate demand characteristics, Widner et al. told one group of participants that a set of general-information questions were difficult, and a group of their peers did poorly on them. A second group of participants was told that the same items were easy, and a group of their peers did well on the items. However, the items were identical from one group to the next. Widner et al. also varied whether the participants were asked to make FOKs or TOTs, also in a between-subjects design. Across the two groups, the FOK ratings were identical. However, the demand characteristics manipulation affected TOTs. The group given expectations that the items were easy generated more TOTs than those who thought the items were hard. Although explanations of this effect have varied (i.e., see Schwartz, 2002a), it does suggest that TOTs and FOKs tap different processes. In this experiment, a dissociation occurred with demand characteristics affecting TOTs but not FOKs.

Schwartz et al. (2000) found one difference between TOTs and FOKs, pertaining to the feeling of imminence. In an experiment, Schwartz et al. asked participants to distinguish between imminent TOTs, that is, those that felt like retrieval was just about to occur and those TOTs for which retrieval did not feel imminent. Although one might suspect that imminent TOTs would be given higher FOKs than non-imminent TOTs, this did not occur. The mean FOK across imminent and non-

imminent TOTs was equivalent. Thus, imminence appears to be captured by TOTs, but not by FOKs. Of course, in three experiments reported in Schwartz et al. (2000), there were strong correlations between TOTs and FOKs, although, like Yaniv and Meyer (1987), these correlations were not perfect.

Neuropsychological research also suggests that TOTs and FOKs may tap different metacognitive processes. Widner et al. (2005), for example, showed that patients with impaired functioning in their prefrontal cortex showed fewer and less accurate FOKs. However, there was no difference between the frontal patients and controls with respect to TOTs. TOTs were just as prevalent and accurate for the frontal patients. Although this data appear surprising, as the neuroimaging data that I am about to present suggest a strong role for the frontal lobes in TOTs, it is possible that one would have to look at patients with greater damage to their frontal lobes to see disturbed patterns of TOTs, whereas the perhaps more inferentially mediated FOKs are affected in the relatively minor damage in the participants studied by Widner et al. (2005).

The neuroimaging data show some potential differences between TOTs and FOKs. For example, both Maril et al. (2001) and Kikyo et al. (2001) found mostly right pre-frontal activity during TOTs. These areas included the anterior cingulate, the right dorsolateral prefrontal cortex and right inferior prefrontal cortex. These areas of the brain appeared unique to TOTs and were not as strongly activated during either Know responses or Don't Know responses (Maril et al., 2001). In contrast, Maril et al. (2003) examined fMRI data during FOK judgments. With respect to FOKs, the unique activity appeared to be in areas in the left pre-frontal cortex, notably the inferior frontal gyrus and in areas of the parietal lobe (Brodmann area 7). Similarly, Jing, Niki, Xiaoping, and Yue-jia (2004) found left prefrontal activity (BA 8 and 47) during FOKs for paired associates. However, the comparison between FOKs and TOTs is compromised by the difference in materials used in the separate studies. Maril et al. (2001) and Kikyo et al. (2001) asked participants to retrieve information from their existing semantic memory, whereas Maril et al. (2003) and Jing et al. (2004) asked participants to retrieve newly learned word pairs. Moreover, Kikyo et al. inferred the presence of TOTs without asking participants to actually make them.

To resolve this discrepancy, Maril et al. (2005) compared TOTs and FOKs *in the same study using the same stimuli*. The stimuli were similar to those of Maril et al. (2001). The experimenters gave the participant two cue words, such as Carmen, Composer, and the participants had to recall the name of the composer of the opera "Carmen" (Bizet). If participants could not recall the target, they had the opportunity to either press a button that meant "FOK" or one that meant "TOT". Consistent with their earlier work, Maril et al. (2005) found that TOTs, but not FOKs, were associated with activity in the anterior cingulate, right dorsolateral prefrontal cortex, and right inferior cortex. They did not find, however, activity uniquely associated with FOKs.

Thus, this study is suggestive that TOTs and FOKs may be qualitatively different judgments, as areas of the brain lit up during TOTs but not during FOKs. However, because the participant in Maril et al. (2005) could only choose to indicate a TOT or a FOK, it is likely that the task demands suggested that TOTs marked stronger states of knowing for the participants than did FOKs. Thus, participants may have used the FOK judgment to indicate that they likely knew the target but were not as confident as when they indicated a TOT. Thus, the areas of the brain that light up

for TOTs but not for FOKs may simply reflect this greater strength or confidence rather than any qualitative differences between FOKs and TOTs. Indeed, it would have been revealing if, using the same stimuli, but different participants, fMRIs could be collected when only a TOT or an FOK is called for.

In summary, there is some data that are suggestive of differences between TOTs and FOKs, but each study in and of itself is not adequate to argue for different underlying processes. However, the behavioral data, the neuropsychological data, and the neuroimaging data all point to the potential that TOTs and FOKs are dissociable. We suggest here that FOKs may rely more on conscious inference, whereas TOTs may rely more on unconscious processes revealed by subjective experiences of surprise, or frustration (consistent with the finding that the cingulate is active during TOTs, but not FOKs). This hypothesis is potentially testable in a number of ways. My students and I are currently examining the effects of a working memory load on TOTs and FOKs. Our hypothesis is that occupying working memory will interfere with the inferential processes involved in FOKs, affecting their accuracy, but TOT accuracy will not be affected, and TOT rates will not be affected at all if the working memory task is not verbal. Preliminary results suggest that TOTs are inhibited when the participant is jointly engaged in a working memory task, but that FOKs are unaffected. Regardless, however, of the success of this hypothesis, further work should elucidate the differences between TOTs and FOKs.

## Summary and conclusions

Nelson (2000) argued that TOTs should not be considered as metacognition. He argued that the term TOT should refer to temporary inaccessibility and not the feeling of temporary inaccessibility. I have respectfully argued here that, at least on this one, Nelson's view was incorrect. I have presented a number of arguments as to why the term "TOT" should refer to the feeling of temporary inaccessibility rather than temporary inaccessibility itself. Elsewhere, I have argued that, although the feeling and temporary inaccessibility are correlated, they are dissociable (see Schwartz, 1999; 2002a). In this paper, I also make the tentative claim that the feeling associated with the TOT may be different than FOKs, at least in some respects. Moreover, this difference may map onto both different metacognitive and cognitive processes. Indeed, the neuroimaging literature suggests that different areas of the brain may be involved in TOTs and FOKs (Maril et al., 2005). Future work should clarify the differences between TOTs and FOKs.

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## References

- Bacon, E., Schwartz, B. L., Paire-Ficot, L., & Izaute, M. (2006). Dissociation between the cognitive process and the phenomenological experience of the TOT: Effect of the anxiolytic drug lorazepam on TOT states. *Consciousness and Cognition*. Paper under review.

- Bahrick, H. (2005). Opening remarks. Paper presented at Memory and Metamemory: Papers in honor of Thomas O. Nelson. Toronto, Canada, November 2005.
- Brown, A. S. (1991). A review of the tip-of-the-tongue experience. *Psychological Bulletin*, *109*, 204–223.
- Brown, R., & McNeill, D. (1966). The “tip of the tongue” phenomenon. *Journal of Verbal Learning and Behavior*, *5*, 325–337.
- Choi, H., & Smith, S. M. (2005). Incubation and the resolution of tip-of-the-tongue states. *Journal of General Psychology*, *132*, 365–376.
- Faust, M., Dimitrovsky, L., & Davidi, S. (1997). Naming difficulties in language-disabled children: Preliminary findings with the application of the tip-of-the-tongue paradigm. *Journal of Speech, Language, and Hearing Research*, *40*, 1026–1036.
- Gollan, T., & Acenas, L.-A. R. (2004). What is a TOT? Cognate and translation effects on tip-of-the-tongue states in Spanish–English and Tagalog–English bilinguals. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, *30*, 246–269.
- Hamberger, M. J., & Seidel, W. T. (2003). Auditory and visual naming tests: Normative and patient data for accuracy, response time, and tip-of-the-tongue. *Journal of International Neuropsychological Society*, *9*, 479–489.
- Harley, T. A., & Bown, H. E. (1998). What causes a tip-of-the-tongue state? Evidence for lexical neighbourhood effects in speech production. *British Journal of Psychology*, *89*, 151–174.
- Jing, L., Niki, K., Xiaoping, Y., & Yue-jia, L. (2004). Knowing that you know and knowing that you don’t know: A fMRI study on feeling-of-knowing (FOK). *Acta Psychologica Sinica*, *36*, 426–433.
- Kikyo, H., Ohki, K., & Sekihara, K. (2001). Temporal characterization of memory retrieval processes: An fMRI study of the “tip of the tongue” phenomenon. *European Journal of Neuroscience*, *14*, 887–892.
- Kohn, S. E., Wingfield, A., Menn, L., Goodglass, H., Berko Gleason, J., & Hyde, M. (1987). Lexical retrieval: The tip-of-the-tongue phenomenon. *Applied Psycholinguistics*, *8*, 245–266.
- Koriat, A. (1993). How do we know that we know? The accessibility account of the feeling of knowing. *Psychological Review*, *100*, 609–639.
- Koriat, A. (1995). Dissociating knowing and the feeling of knowing: Further evidence for the accessibility model. *Journal of Experimental Psychology: General*, *124*, 311–333.
- Lesk, V. E., & Womble, S. P. (2004). Caffeine, priming and tip of the tongue: Evidence for plasticity in the phonological system. *Behavioral Neuroscience*, *118*, 453–461.
- Litman, J. A., Hutchins, T. L., & Russon, R. K. (2005). Epistemic curiosity, feeling-of-knowing, and exploratory behavior. *Cognition and Emotion*, *19*, 559–582.
- Maril, A., Simon, J. S., Mitchell, J. P., Schwartz, B. L., & Schacter, D. L. (2003). Feeling-of-knowing in episodic memory: An event-related fMRI study. *NeuroImage*, *18*, 827–836.
- Maril, A., Simons, J. S., Weaver, J. J., & Schacter, D. L. (2005). Graded recall success: An event-related fMRI comparison of tip of the tongue and feeling of knowing. *NeuroImage*, *24*, 1130–1138.
- Maril, A., Wagner, A. D., & Schacter, D. L. (2001). On the tip of the tongue: An event-related fMRI study of semantic retrieval failure and cognitive conflict. *Neuron*, *31*, 653–660.
- Metcalfe, J. (1993). Novelty monitoring, metacognition, and control in a composite holographic associative recall model: Interpretations for Korsakoff amnesia. *Psychological Review*, *100*, 3–22.
- Metcalfe, J., Schwartz, B. L., & Joaquim, S. G. (1993). The cue familiarity heuristic in metacognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *19*, 851–861.
- Miozzo, M., & Caramazza, A. (1997). Retrieval of lexical-syntactic features in tip-of-the-tongue states. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 1410–1423.
- Nelson, T. O. (1996). Consciousness and metacognition. *American Psychologist*, *51*, 102–116.
- Nelson, T. O. (2000). Consciousness, self-consciousness, and metacognition. *Consciousness and Cognition*, *9*, 220–223.
- Perfect, T. J., & Hanley, J. R. (1992). The tip-of-the-tongue phenomenon: Do experimenter-presented interlopers have any effect? *Cognition*, *45*, 55–75.
- Ryan, M. P., Petty, C. R., & Wenzlaff, R. M. (1982). Motivated remembering efforts during tip-of-the-tongue states. *Acta Psychologica*, *51*, 137–147.
- Schwartz, B. L. (1994). Sources of information in metamemory: Judgments of learning and feelings of knowing. *Psychonomic Bulletin & Review*, *1*, 357–375.
- Schwartz, B. L. (1998). Illusory tip-of-the-tongue states. *Memory*, *6*, 623–642.
- Schwartz, B. L. (1999). Sparkling at the end of the tongue: The etiology of tip-of-the-tongue phenomenology. *Psychonomic Bulletin & Review*, *6*, 379–393.

- Schwartz, B. L. (2001). The relation of tip-of-the-tongue states and retrieval time. *Memory & Cognition*, 29, 117–126.
- Schwartz, B. L. (2002a). *Tip-of-the-tongue states: Phenomenology, mechanism, and lexical retrieval*. New Jersey: Erlbaum.
- Schwartz, B. L. (2002b). The strategic control of retrieval during tip-of-the-tongue states. *Korean Journal of Creativity and Problem-Solving*, 12, 27–38.
- Schwartz, B. L., & Frazier, L. D. (2005). Tip-of-the-tongue states and aging: Contrasting psycholinguistic and metacognitive perspective. *Journal of General Psychology*, 132, 377–391.
- Schwartz, B. L., & Smith, S. M. (1997). The retrieval of related information influences tip-of-the-tongue states. *Journal of Memory and Language*, 36, 68–86.
- Schwartz, B. L., Travis, D. M., Castro, A. M., & Smith, S. M. (2000). The phenomenology of real and illusory tip-of-the-tongue states. *Memory & Cognition*, 28, 18–27.
- Smith, S. M. (1994). Frustrated feelings of imminent recall: On the tip-of-the tongue. In J. Metcalfe, & A. P. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp. 27–46). Cambridge: MIT.
- Vigliocco, G., Antonini, T., & Garrett, M. F. (1997). Grammatical gender is on the tip of Italian tongues. *Psychological Science*, 8, 314–317.
- Widner, R. L., Otani, H., & Winkelman, S. E. (2005). Tip-of-the-tongue experiences are not merely strong feeling-of-knowing experiences. *The Journal of General Psychology*, 132, 392–407.
- Widner, R. L., Smith, S. M., & Graziano, W. G. (1996). The effects of demand characteristics on the reporting of tip-of-the-tongue and feeling-of-knowing states. *American Journal of Psychology*, 109, 525–538.
- Yaniv, I., & Meyer, D. E. (1987). Activation and metacognition of inaccessible stored information: Potential bases for incubation effects in problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 187–205.