Cross-Modal Feature and Conjunction Errors in Recognition Memory

Todd C. Jones

New York University/Victoria University of Wellington, Wellington, New Zealand

Larry L. Jacoby

New York University/Washington University in St. Louis

and

Les A. Gellis

University of Memphis

Four experiments were conducted to investigate whether a modality-specific familiarity contributes to feature and conjunction errors and, hence, to recognition memory. In each experiment, the presentation modality of compound words was manipulated at study (auditory or visual), and in Experiment 2 the presentation modality for the test also was manipulated. In Experiment 3, participants were pushed to respond quickly in order to create a reliance on familiarity rather than recollection. In Experiment 4, a direct manipulation of response deadline was employed. Across experiments, auditory and visual tests did not produce different hit rates or feature and conjunction error rates, and shifts in study-to-test modality did not affect hit rates or feature and conjunction error rates. The response deadline manipulation of Experiment 4 affected old/new discrimination but not feature and conjunction effects (feature/new and conjunction/new discrimination), producing a dissociation. Unlike implicit perceptual memory, modality information does not appear to contribute significantly to the familiarity underlying feature and conjunction errors. The familiarity underlying feature and conjunction errors, and thus in recognition memory, is different from the familiarity underlying perceptual implicit memory. © 2001 Academic Press

Key Words: recognition memory; false recognition; feature errors; conjunction errors; modality effect; recollection; familiarity; dual-process theory.

A renewed interest in false memory phenomena has attracted much attention and has spawned several articles—enough to warrant a special issue of *Journal of Memory and Language* (1996) on illusory memories. The experiments in this article add to research on a particular false recognition phenomenon. In this research, items presented during a study phase serve as primes for lures on a later recognition test. For example, the presentation of study word primes such as *gemstone, heartburn,* and *drumbeat* bias participants to falsely judge test lures such as *headstone* (part old, part new; called a feature lure) or *heartbeat* (both parts old but rearranged; called a conjunction lure) as having been presented in the earlier study phase (Underwood, Kapelak, & Malmi, 1976; Reinitz, Lammers, & Cochran, 1992). Typically, participants correctly identify old words at a greater rate than they misidentify conjunction, feature, or new words. Conjunction errors are produced at a higher probability than feature errors, which in turn, are produced at a higher probability than new words (old > conjunction > feature > new). Conjunction errors have been obtained with a variety of materials, including words (e.g., conjunction of syllables; Underwood &

Zimmerman, 1973; Reinitz et al., 1992), compound words (Ghatala, Levin, Bell, Truman, & Lodico, 1978; Underwood et al., 1976), word phrases (Underwood et al., 1976), face drawings (Reinitz et al., 1992; Reinitz, Morrisey, & Demb, 1994), photographs (Bartlett & Searcy, 1998), and abstract pictures (Kroll, Knight, Metcalfe, Wolf, & Tulving, 1996). In addition, conjunction errors have been obtained for different subject groups (e.g., normal young adults and amnesics, Kroll et al., 1996; Reinitz, Verfaellie, & Milberg, 1996; young and older adults; Kroll et al., 1996; Rubin, Van Petten, Glisky, & Newberg, 1999).

Two theoretical approaches have been used to explain conjunction errors. One view follows a representational approach (primarily), and the other view follows a procedural account. The representational viewpoint proposes the existence of specific types of memorial *representations* (e.g., Kroll et al., 1996; Reinitz et al., 1992, 1994, 1996). In contrast, the procedural approach focuses on the *processes* involved in a given memory task (e.g., Jones & Jacoby, 1997; Rubin et al., 1999) without making any claims about representations. In some sense the two frameworks are similar. Both approaches use two factors to explain conjunction errors. What differs between the two views is how those two factors are used to account for the errors. For example, the current state of the representational viewpoint explains conjunction errors but neglects feature errors. Also, the representational approach does not address potential differences in retrieval dynamics for the different types of representations. In contrast, a dual-process account explains both feature and conjunction errors and has different retrieval dynamics for the different processes. Although we point out the differences between the two approaches, the general distinctions are not far apart in our view.

The representational approach proposes two types of representations, features and configurations (e.g., Kroll et al., 1996; Reinitz et al., 1992, 1996). Features are lower level representations and may be bound together to form more global or configurative representations. For example, the word *gemstone* would be encoded as two separate features, *gem* and *stone.* In addition, these two features could be bound to form a configurative representation, *gemstone.* Recognition of old words is suggested to be based on both features and configurations. False recognition of conjunction lures is thought to be based on either features in the absence of configurations (e.g., Kroll et al., 1996; Reinitz et al., 1992, 1996) or inaccurate configurations formed during encoding (Kroll et al., 1996). The rate of old word recognition is typically greater than the rate of conjunction errors because recognition of old words benefits from configurative representations in addition to features.

One hypothesis on conjunction errors promotes the idea that the errors are produced because of a failure to bind features together during encoding or because a configuration has been forgotten (e.g., Kroll et al., 1996; Reinitz et al., 1992, 1994, 1996). In other words, this hypothesis promotes the idea that conjunction errors occur because a configurative representation is unavailable. For example, for the study words *blackmail* and *jailbird,* the features *black* and *bird* (and, presumably, *mail* and *jail*) would be available (and accessible) but the configurations, *blackmail* and *jailbird,* would not be available.[1] In the absence of a configuration, the two features, *black* and *bird,* could be conjoined during retrieval, creating an illusion that the word *blackbird* was presented earlier in the study phase. Feature errors have not been considered to be different from chance (Reinitz et al., 1992, 1996). Thus the theory has not been developed to account for these errors.

An additional, but less developed, hypothesis on conjunction error production was suggested by Kroll et al. (1996). In their proposal, conjunction errors may occur, in part, because the components of study primes are inappropriately bound during the study phase. For example, for the study words *blackmail* and *jailbird* the elements *black* and *bird* could be bound inappropriately during encoding *to form an inaccurate configurative representation, blackbird.* This

---

[1] The terms "available" and "accessible" are used here in the same spirit as in Tulving and Pearlstone's (1966) article.