

### ***Caffeine and low alertness situations***

Caffeine often has its biggest effect when alertness is low (e.g. in the early morning or when working at night). Research has shown that the decreased alertness produced by consumption of lunch can be eliminated by consumption of caffeinated coffee (see Figure 3.1 – Smith et al., 1991; Smith and Phillips, 1993).

Furthermore, alertness is often reduced by minor illnesses such as the common cold, and caffeine can remove the impaired performance and negative mood associated with these illnesses (Smith et al., 1997a). The ability of caffeine to counteract the effects of fatigue has been confirmed using simulations of driving (Horne and Reyner, 1996; Reyner and Horne, 1997). A study of simulated assembly line work (Muehlbach and Walsh, 1995) also demonstrated significant improvements after caffeine on five consecutive nights and showed no decrements when caffeine was withdrawn.

Some of the above studies allow one to assess the magnitude of the effects of caffeine. For example, Smith et al., (1993) found that consumption of caffeine at night maintained individuals at the levels seen in the day. Another approach has been to compare the effects of caffeine with other methods aimed at counteracting sleepiness. Bonnet and Arand (1994a,b) report that the combination of a prophylactic nap and caffeine was more effective in maintaining nocturnal alertness than was the nap alone. Other studies have continued to demonstrate that caffeine can remove impairments produced by sedative drugs (e.g. alcohol – Hasenfratz et al., 1993; scopolamine – Riedel et al., 1995; lorazepam – Rush et al., 1994a; triazolam – Rush et al., 1994b).

One issue is whether positive effects of caffeine are largely restricted to low alertness situations. Battig and Buzzi (1986) argued that caffeine can improve performance beyond a mere restoration of fatigue. Other studies have shown that fatigued subjects show larger performance changes after caffeine than do well-rested volunteers (Lorist, Snel and Kok, 1994; Lorist et al., 1994). Another issue is whether caffeine exacerbates negative effects produced by stressful conditions (e.g., electrical shocks – Hasenfratz and Battig, 1992; noise – Smith et al., 1997b) and results suggest that it does not.