

SLEEP AND RECOVERY DURING A SUSTAINED TRAINING SESSION

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INTRODUCTION

The effects of fatigue during sustained effort on the sleep habits of soaring pilots during 2 or 3 weeks training sessions at the French National Soaring Center of Saint-Auban have been investigated.

Recent works have shown that sustained effort can lead to sleep loss and can deeply affect subsequent work, not only the day after but two days later.

The investigations were made on:

- 8 glider pilots with at least 5 years cross-country experience (about 500 hours), recorded during a 15 day training session in August, 1989.
- 12 pilots with 5 to 10 years (about 1,000 hours) experience, recorded during the 3 weeks of their soaring instructor qualification in September, 1990.

The pilots included members of both groups, were aged between 18 and 48, and had varying levels of mountain flying.

PROGRAM

During the last 15 days of the 3 week instructor session, and during the 15 days of the "perfect" session, every morning and evening they had to answer a questionnaire upon their occupations:

- duration and intensity of effort during group or personal theoretical work and in-flight courses.
- duration and quality of sleep,
- self-estimation of vigilance, sleepiness and naps.

This method has been compared to EEG recordings and gives good results.

The last days of the session were monitored as followed: 2 days of inactivity, 5 or 6 days with 2 flights each day, 2 days of inactivity, 4 or 6 days with 2 flights each day, and final 2 days of rest.

What is of much interest is to observe the variations of the quantity and quality of their sleep not only during the periods of activity, but also in the periods without flying.

RESULTS

The first result was that the task was too tiring and its duration has been recently shortened to 3 weeks only for the instructor trainees.

Secondly, pilots generally need more sleep during the nights following periods of activity than during the nights following days without activity.

Figure 1 shows the lengths of sleep and of soaring flights by a boy of 20 and a girl of 24 for 6 days, 2 days without flying and then 4 days of flying.

We observe that these young pilots have in general a quite uniform quantity of sleep. After they arrive in Saint-Auban, they have regular times of falling asleep and of waking up in the morning. But "JB," who drove a long time alone to arrive at the soaring center, needs 4 nights to sleep well. The lengths of their nights is different: JB needs less time than "Anne."

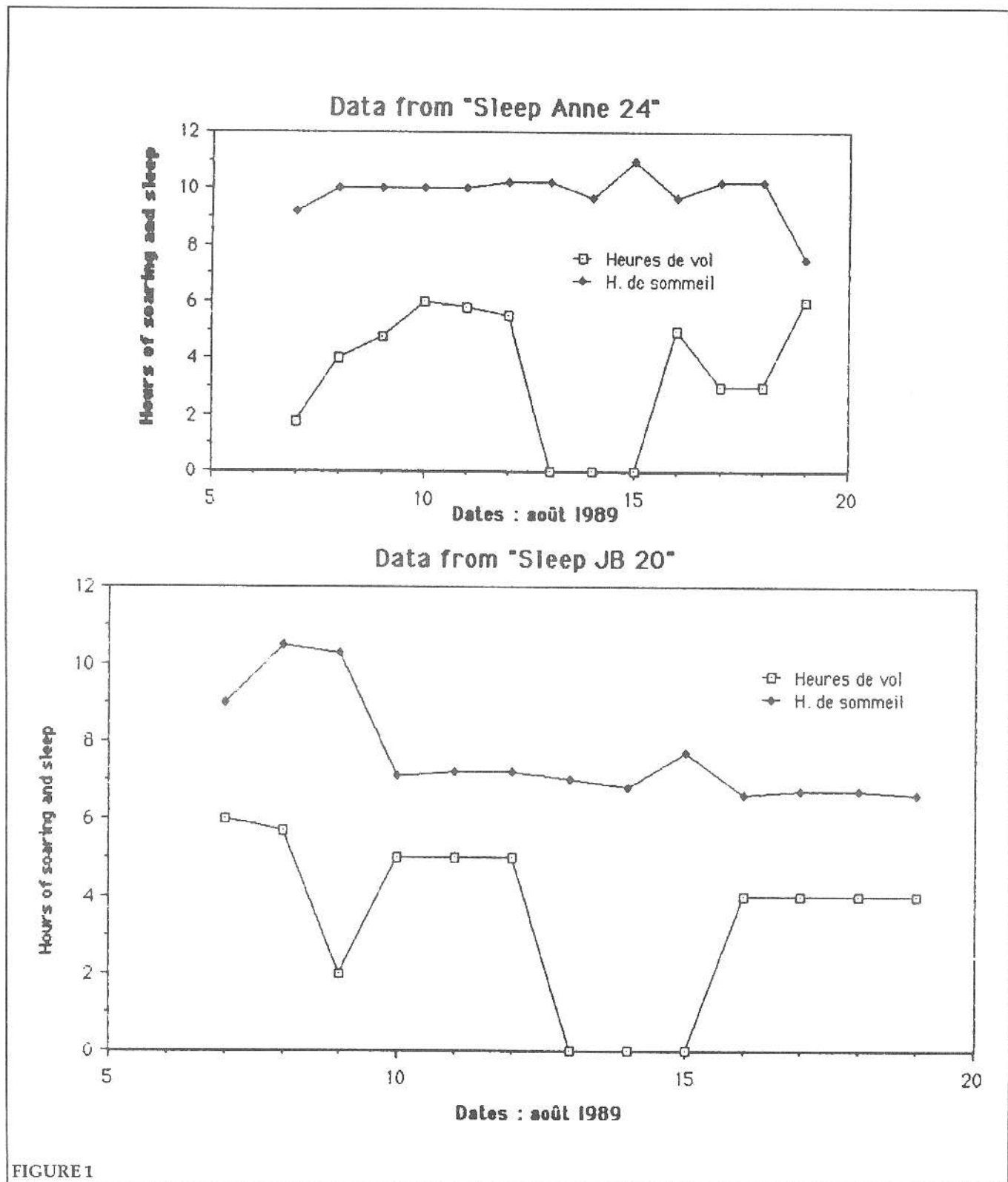


FIGURE 1

On the third day of the weekend, they sleep 1 hour longer.

Figure 2 shows information for two instructor-trainees (aged 42 and 47) who have in general a less uniform quantity of sleep.

"BM" flies very regularly 4 hours each day, but he has an

irregular duration of sleep, which depends probably on the nature of the flights.

For "GG" the sleep duration is generally in inverse ratio to his flight time. This is surprising, as effort will induce less sleep. Also he sleeps a much longer time during the weekend and after the session. This is the cue that this pilot

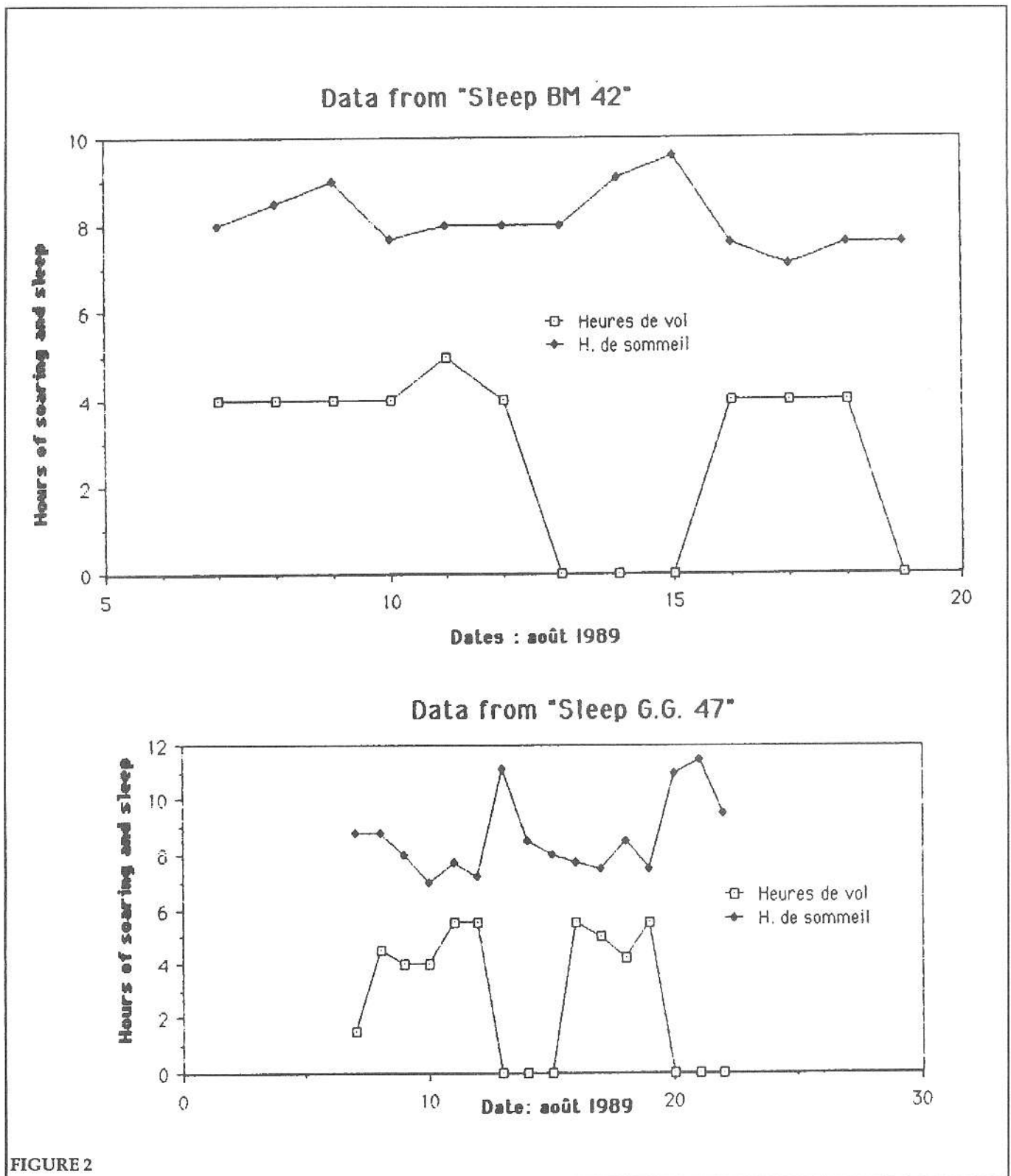


FIGURE 2

was not sufficiently trained, the flight conditions made him tired and he suffered sleep loss.

For these older pilots, the long night is not the first after the last flight of the first week, but the second. This supports the earlier work.

For men and women aged more than 35, the sleep was

very often of poor quality: the pilots had many sleepiness problems, with yawning during work and sometimes in flight.

The trainers reported that sleep loss affected pilots the second day after, with many judgment errors in flight and longer times to take decisions.

CONCLUSIONS

These findings suggest that fatigue during sustained soaring sessions can heavily affect the pilots' capacities by shortening and disturbing their sleep. Young people suffer less than those of 35 or more, whose capacities to fight against fatigue seem to decrease very rapidly after the third hour of a flight.

The effects are mainly:

- in the quantity of sleep needed in the following days,
- in decision taking and judgment errors.

This suggests that pilots and trainers must take care of their sleep, especially during sustained training or competition sessions.

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