



Fatigue, Exhaustion, and Somnolence

Sleepiness and fatigue are usually not caused by lack of sleep.

Jim felt a bump, turned and instantly encountered light sink. He groaned, turned back on course. Too much of that today! He began to doubt himself: could he still tell the difference between a turbulent bump and a thermal? Had he lost all judgment? It was that sort of a day: Clouds small and scattered, bases 3000 agl, climb rates 0.5 to 1.5 kt in the thermals he'd found.

But...he'd managed 70 nm. On the other hand, it took two hours. He imagined that a world champion could make this flight without turning, zipping along by feel and experience. He wondered, "Why am I doing this?"

His flight computer provocatively said he had to find 11,000 ft of climb to finish his task today, and unless the day got stronger, that added up to almost two hours of thermaling; well, grinding, really. He felt his way along, getting lower and making mental note of mown hayfields.

He saw a nice wisp downwind of a large field and flew past the field's downwind side. A bump. A wrong turn. Another bump. He wrapped up in a nice, steep bank, felt the glider lift and heard the vario chirp happily. The vario was bouncing as high as 2, the averager over one knot. Here was respite for another 15 minutes or so, to get enough altitude to permit some choice among the few clouds ahead.

However, maybe today, choice was not what he really needed. Maybe he should just leave his fate to the *anemoi*.

On a good day, *Zephyrus* and *Boreas*, the soaring-friendly gods, would spin him up high and carry him far, but today, *Argestes* and *Notos* had been pretty much in command: Southerly winds bring low bases and weak lift. Which begs the ques-

tion, Why tempt the gods? When we're 70 miles from home on a weak day, we have the same slog back that got us out, only we're more tired, but an unplanned land out to lay down for a rest – attractive though it might seem at the moment – does not make life easier.

As Jim got near cloud base, he felt overwhelmed by sleep. He struggled to keep his eyes open. It was the same sensation he'd had years ago as the dawn began to break after he first drove all night, it had taken tremendous force of will to prop up his eyelids and keep his attention on the road. As he'd begun that climb, he'd felt tired and discouraged, but now he felt absolutely somnolent. He decided to drop the task and head for home.

He turned on the new course and looked at the few clouds ahead to decide which was the most promising. An instant later – or *was* it an instant? – he found himself in a gentle, descending left turn. He shook his head to fight the drowsiness. The words, "benign spiral mode" somehow came to mind. He felt embarrassment.

"Why am I sleepy?" he wondered. He took a brief inventory of his recent life. He'd slept well last night, but the night before he'd been up three times dealing with a severe thunderstorm that included a tornado warning, wind that put a tree limb on his roof, and a four-hour power failure. He wasn't sick, but he did have a slight sore throat this morning, come to think of it.

He and his wife had taken a 20-mile bike ride after breakfast this morning, but he was used to that. Come to think of it, she *had* been a little tart while he walked through the kitchen to the garage, "Well, I guess *I'll* be mowing the lawn this afternoon." What? It could wait! The sky would not.

He had skipped lunch in order to assemble, but had eaten a banana while waiting for tow, and had had some water already. He was glad to be away from work today – his boss, lately, had been finding fault with every little thing any of his underlings had done, except for home runs. There was no telling when he'd jump on someone. But everyone has this sort of stress. Yet, today, what a pleasure to be accountable only to the glider.

Looking at the forecast and the sky that morning, nothing in life had seemed as urgent or as important as being up amongst the clouds, climbing and gliding as far as the conditions allowed. Now, he was not only sleepy, but also discouraged and fatigued. The long flight home seemed like a heavy burden. He decided to sell the glider. (An urge that would pass, as transient as an intestinal cramp, as soon as he had final glide made.)

Why torpor?

How many of us have ever felt like this while gliding? Tired? Discouraged? Sleepy? Probably more than would admit to it, eh?

Why did Jim feel so bad? (Why might *we* feel so bad?) Jim had a number of good reasons to be fatigued, which feeds despair and nourishes pessimism.

Typically several things conspire together to cause any type of fatigue. Usually, there are groups of things. It's difficult to judge the exact cause because nearly everything we do may cause fatigue, and things happen in bunches. Here's a list of some important causes; Jim had pretty much all of them:

- Motion-induced drowsiness (*sopite syndrome*)
- Stress-induced social or psychological fatigue
- Low energy reserves (oxygen, fuel = hypoxia, diabetes, fasting, bonking, alcohol-induced hypoglycemia)
- Infectious illness (viral, bacterial, etc.)
- Physiological degradation (thirst, volume depletion, illness, acidosis)
- Jet lag (shift work sleep disorder, etc.)
- Poor quality sleep (central and obstructive sleep apnea, spousal snoring, etc.)

Today I want to focus on two of these: the *sopite syndrome* and disruption of circadian biorhythms (jet lag or shift work sleep disorder).



What is the *sopite syndrome*?

The *sopite syndrome* is *motion-induced drowsiness* and *mood change*. During World War II, it was observed that very mild motion sickness might exist only as apathy, loss of interest, or discouragement, yet until recently, it was not generally realized that sleepiness might be caused by motion itself.

This reflects the narrow boundary between sickness and health – after all, drowsiness is a *normal* response to motion: after all we rock babies to sleep, or take them for a ride in the car; and we do not think the babies are ill. It's a sickness only when we don't want it to happen, when it interferes with work or play.

"Regular" motion sickness includes nausea; and perhaps vomiting, cold sweats, sweating, pale skin, or excessive salivation. When motion sickness doesn't cause nausea, it may only cause lethargy. For example, some people on cruises spend a lot of time sleeping. They blame everything *but* the ship's motion. And, indeed, the other causes may play a role, but...

Research in the last quarter of the 20th century showed that motion often causes drowsiness when there's no other reason for it, even in fit, highly-trained pilots. A classic experiment put three or four pilots in a big room that was turning at about 4 revolutions per minute for a few days. There was memorable lassitude in many of the pilots.

Jim fell asleep for a few seconds of sleep after the top of his last thermal. This is called *micro-sleep*. When we feel drowsy and are fighting to stay awake, we have micro-sleeps of which we are not aware of as keenly as the ones we detect by waking up. This is a danger to drivers and pilots – if I may be so annoying as to point out the obvious – and it's scary. It's scary to the passengers, at least; and I hope it's scary to the driver.

Treating *sopite syndrome*

I've had a lot of experience with this, I hate to say, and there are three things to be done:

- First, try to eliminate other causes of fatigue.
- Second, fly a lot. All motion sickness attenuates with repeated exposure. Bob Hoover, the famous pilot, tells of being very prone to it when he was young, and discovered that daily aerobatics was a delightful cure.

- Third, caffeine. Early in the season, I take one water bottle full of cold-press coffee and drink that first. Or I buy caffeinated Shot Bloks™ and eat three, one about every 30 minutes. Be careful of energy drinks; some have huge doses of caffeine

- a cup of coffee has about 80 mg.

Don't get a prescription from your doctor for modafinil (Provigil®) or armodafinil (Nuvigil®). These have the advantage of not causing heart palpitations, increased blood pressure, or emotional irritabil-

ity that caffeine sometimes causes. But, they are not FAA-approved for pilots! The FAA requires that pilots refrain from flight duties for *45 days* after the last use of either of these medications. (No, I don't know why. But the FAA does base these things on performance testing.)

Circadian Disruption

Anything at all that disturbs our normal regular sleep times will cause this, such as Jim's thunderstorm. This was first called "jet lag" in the 1960s, after rapid

international travel became commonplace. Before that it was called “motherhood,” caused by the infant waking up every two hours.

Its current name is *Shift Work Sleep Disorder* because this most common and important. It disrupts lives and families and fosters injury at work.

If you want to know more about this, read the inset on time-shift sleep disorder.

What is fatigue, anyway?

We have many related words to describe varieties of fatigue; torpor, lassitude, or despond, all of which involve the absence of vivacity, zip, ginger, bounce, or dash.

There is “mental” fatigue from sustained and difficult brain work; “emotional” fatigue from social stress or personal failure. There is physical exhaustion from effort, and the “bonk” of prolonged work when muscle and liver glycogen stores are depleted.

Ironically, one activity can rejuvenate us from the exhaustion of another. Physical exercise can get rid of pain or emotional exhaustion. Intellectual challenge can res-

cue us from lassitude or torpor. Playing with our children can help make work burnout disappear, and so on.

The causes of fatigue are too many to encompass in this short essay, as every metabolic, hormonal, or mental abnormality can create weariness. Infections, medications, and food can make us tired.

What to do?

The reason we have to examine ourselves is that the best way of alleviating fatigue is to understand what got us there, and fix that.

In flight, there are really only a few things we can do, each of which requires planning for the need:

- land
- drink
- eat
- put on oxygen
- fly straight and level for a while (either ‘dophining’ or circling can cause motion sickness).

Sleepiness is different from other fatigue states. In my experience, it usually stems from one of three things:

- disturbed or poor-quality sleep;

- motion (sopite syndrome); or
- psychological stress.

My experience is that recovery is very fast if the cause is psychological stress, as soon as we escape from it and engage our minds in something good; and that recovery from motion-induced sleepiness is also quick if we stop the motion that caused it. Flying straight and level resolves my own sleepiness in minutes.

Disturbed sleep can be caused by factors external to us, such as a snoring roommate, the telephone, a baby, work duties, noises intruding from outdoors, and so on. I remember a night in a new hotel that was fine until the fire alarm went off every three minutes for 20 minutes. I doubt that anyone on that floor slept the rest of the night.

More important medically is that disturbed sleep can be due to physical abnormalities. The Portly Pilot Syndrome

often includes obstructive sleep apnea, which can result in secondary physical disease, and makes the sopite syndrome more likely.

Fatigue means *something's wrong*.

The most important thing is that if you

feel fatigued, weary, debilitated, sluggish, lassitude, or torpor, first, consider making a “no-go” decision (or divert to a landing) until you’ve examined yourself to identify the possible causes.

At altitude, mild hypoxia or dehydration is probably most likely; failure to snack may be the cause. On the ground, review the past couple of days for possible causes, and fix what you can.

Inset: **Fatigue checklist**

- 1: Hypoxia.
- 2: Motion-induced drowsiness
- 3: Dehydration or volume depletion
- 4: Sleep disturbance.
- 5: Illness
- 6: Social stress
- 7: Abnormal energy reserves and transport (diabetes, fasting, hypoxia, anemia)
- 8: Sedative medications
- 9: Muscle exhaustion
- 10: After-meal drowsiness
- 11: Effort: physical, psychological, metabolic, intellectual, or social.

Good additional reading

[http://www.cjcm.org/content/78/10/](http://www.cjcm.org/content/78/10/675.full.pdf+html)

[675.full.pdf+html](http://www.cjcm.org/content/78/10/675.full.pdf+html) doi: 10.3949/ccjm.78a.10083

“*Jet lag and shift work sleep disorders: How to help reset the internal clock*” Bhanu Kolla and Robert Auger, Cleveland Clinic Journal of Medicine October 2011 vol. 78 No. 10 pp. 675-684.

http://archive.org/details/sopite_syndromein00flah

“*Sopite Syndrome in operational flight training*” David Flaherty, Naval Postgraduate School, Dudley Knox Library, September, 1998.

<http://www.faa.gov/pilots/safety/pilotsafetybrochures/media/FatigueAviation.pdf>

“*Fatigue in Aviation*”, G.J. Salazar, Publication #OK-07-193, FAA-CAMI

Footnotes:

The curse the the Internet: we can look up interesting, distracting trivia. Thus we discover that the *anemoi* are the Greek gods of the winds. *Boreas* is the god of the north wind, *Zephyrus* of the west or northwest (depending on the era), *Notos* the south, and *Eurus* the east (sometimes, northeast). *Argestes* is

(in later eras) the god of the southwest wind.

This is all a little vague because there wasn’t any textbook of meteorology until Aristotle filled that void by writing one. Meanwhile, wind names changed through the centuries. Yet whatever else might have annoyed the gods, changing their wind assignments seems not to have been a problem. Science was a lot more entertaining when it involved gossip stories about the gods.

In America, the endurance athlete is said to “bonk” when glycogen stores in muscle and liver are exhausted, and the athlete simply doesn’t have the strength to continue. In the British Empire, it’s what might happen after the pretty girl and the handsome man have a nice chat at the pub. I am not British.

For a long list of the caffeine levels of a long list of beverages, <http://www.energyfiend.com/the-caffeine-database>

I invented this syndrome; it’s not an Official Disease. In Wisconsin, where I live, it’s the Portly Packer Backer Disease, from observing others exercise instead of committing it personally. ✂