

EVALUATION OF PSYCHOMOTOR CAPACITIES DURING A SUSTAINED TRAINING SESSION

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According to Fleishman and Quaintance (1984) performances in sports can be analyzed as the result of a combination of several "abilities" or "capacities":

- physical abilities, such as strength of arms and legs, coordination, balance,
- psychomotor abilities, such as reaction and decision time, fine movement control,
- cognitive and psychological abilities, like speed of perception, decision taking and judgment subtlety,
- sociological capacities, as team workability, support.

Coaches often describe the ability to perform the basics of soaring in terms of psychomotor capacities:

- reaction time (RT) is the time in which a subject is capable of responding to a well-known stimulus when it occurs,
- decision time (DT) also named choice reaction time (CRT) is the time in which a subject is capable of detecting one known stimulus between several, to integrate the information and choose the appropriate known motor response,
- control of fine movements (CFM) is the ability to perform static or dynamic fine movements, as in piloting.

Many studies indicate that sportsmen have in general a shorter reaction time and decision time than non-sportsmen, and that they also have a better control of fine movements. It appears also that sustained exercise brings about a lessening of psychomotor capacities. Thus, subjects with good physical aptitudes would be more capable of conserving, or even increasing their psychomotor capacities during an "sustained" exercise of middle to high intensity.

(We call "continued" an activity of more than 72 hours without the possibility of stopping it for long rest-pauses or sleep times. We call "sustained" an activity of more than 72 hours, which demands many big efforts in which it is impossible to stop when fatigue occurs, but in which there may be several rest and recovery pauses.)

1. Methods

We proposed to verify the above hypothesis by studying how simple reaction time, decision time and fine movements control can vary or not by good soaring pilots during a 3 week sustained training session.

We decided to test them after a first week of work, during 4 days (day 8 to day 11). We also tried to avoid the fatigue effects of the travel most of them had to do at the beginning of the session. The tests made on the pilots on

- Before going on the field :

for each pilot :

installing and starting the cardio-frequence meter

trémometer-test : static method, during 1 minute

test of reaction-time : 32 visual stimuli

test of choice reaction time : 32 visual stimuli

(total duration : 35 minutes)

- Between 2 flights

trémometer-test, static, 30 seconds

test of reaction-time : 16 visual stimuli

test of choice reaction-time : 16 visual stimuli

**- at the end of the last flight of each pilot, for
each day**

trémometer-test : static method, during 1 minute

test of reaction-time : 32 visual stimuli

test of choice reaction time : 32 visual stimul

end of the cardiometer recording

(total duration : 35 minutes)

FIGURE 1. Soaring Protocol.

the ground are shown in Figure 1. In addition, during the flights the heartbeat frequency was measured with a miniaturized cardio-frequence meter each minute.

2. Results

2.1 Heartbeat frequency.

This is generally higher at the end of the flights than at the beginning; the difference is not significant, but increases a little more each day. (The effect is well-known and is a cue of fatigue.) The frequency was less influ-

enced by cross-country flights than by one-hour test flights, which they had to perform just after words with their instructors.

2.2 Simple reaction time.

On average, pilots do not present significant differences between the RT measures before and after the flights. However individual pilots varied considerably in this respect.

2.3 Choice reaction times.

On average, pilots do not present significant differences between the CRT measures before and after the flights, although 2 pilots had significantly better measures after the flights than before on 2 occasions.

2.4 Control of fine movements.

Pilots have various results in controlling fine movements at the end of the cross-country flights:

- one has possible heavy problems,
- 3 pilots have significant difficulties,
- 2 have significantly better results after than before the flights.

Concluding Remarks:

1 - The RT capacities of the pilots seem not to be affected by physical fatigue. But this can be also understood as a proof that the flights were for pilots of moderate level.

2 - Instructors noted that trainees often failed in their decisions, but that the meantime of the good responses were better after the flights than before: we think that pilots had a middle level physical

fatigue, which activates their Decision Time capacity.

3 - Finally, control of fine movements which is one of the basic capacities in soaring piloting appears to be the psychomotor ability most effected by physical fatigue. But it is not always the case. We think however there is a need for better physical and psychomotor training too often neglected.

This was a preliminary research. Its aim was to know with better precision which are the abilities involved in different sports and how they are affected by fatigue or recovered by various techniques. We are now working to make a larger survey on these psychomotor abilities and to study their evolution during learning in several sports, including soaring. We are looking also at cognitive abilities, especially perception, space perception and self-positionment, decision taking alone and in team, and so on, which seem to be much involved in high level soaring.