eTimeAid: A six-module time-keeping and event-counting software

Medical research workers have been using time-measuring devices for several generations. The major devices in use are the mechanical stopwatches and timers. These are generally expensive, difficult to maintain and notoriously inaccurate as per the current standards. Moreover, these are separate devices and one has to procure each of them separately. The more recent electronic stopwatches are multi-purpose with stop-watch and timer in the same device. The cheaper variety has a short life and the durable variety is expensive. In both mechanical and electronic versions, the investigator has to keep alternating his gaze between the stopwatch and the object viz. an animal, instrument or assembly, which can result in inaccuracies.

The authors present computer software developed for the time-keeping and event-counting needs of the research worker in general, and the pharmacologist, in particular. Though this software has been developed using Visual FoxPro 7.0 Professional Edition licensed to Dayanand Medical College and Hospital, Ludhiana, commands of older versions (Visual FoxPro 3.0) have been used so as to maintain compatibility between different versions. It should, therefore, be able to run on FoxPro 2.6 as well as different versions of Visual FoxPro. A few adjustments in display may be required due to different display settings of different systems. These can be made by any computer-literate subject.

The software can be run from the command window by issuing the “do eta” (abbreviation for eTimeAid) command (without quotes). This presents the user with a typical FoxPro Menu from which options can be selected by a mouse click, highlighting an option and pressing “Enter” or by using the hot key viz. the underlined letter in each menu option. On selecting an option, the screen is cleared and the user is presented with three choices for each option i.e. starting the specified task, introduction and returning to the main menu. On selecting the introduction, the user is shown a few lines about the purpose of the option, method of use and a typical situation in which it can be used. Space Bar and Enter are the major keys used for all options as these are the most prominent on the keyboard. Numeric keys are used only to enter the required numeric information like the length of time for a timer. Other keys are meant to be used sparingly to edit titles in the database file.

1. **Stopwatch:** On selecting this module and then “Stopwatch”, the user is prompted to start the stopwatch by pressing the Space Bar. As soon as this key is pressed, the stopwatch starts and the screen displays the current date, time and the time elapsed in seconds, up to three decimal places. The user is prompted to press the Space Bar to stop the stopwatch. The user can then record the reading on his observation chart and either start the stopwatch again (and again) or return to the main menu. This module can be used for any experiment where a stopwatch is required e.g. measurement of ‘tail flick latency’ by analgesiometer or ‘reaction time’ by hot plate method.

2. **Timer:** This is a countdown timer used to display the time left for a pre-selected period of time to be over. A typical use is in marking time for psychomotor performance tests. The user is prompted to enter the time (seconds) and then to start the timer by pressing the space bar. It then shows the time left in whole seconds.

3. **Lap Watch:** This module is meant for use where laps of time are to be recorded e.g. different phases of convulsion in ‘maximal electroshock seizures’. The user is first prompted to select the number of laps up to a maximum of six. He is then allowed to give titles to the laps e.g. ‘tonic flexor phase’, ‘tonic extensor phase’ and ‘clonic phase’. The user can start the first lap by pressing the space bar. Each subsequent press of the space bar stops the current lap and simultaneously starts the next, till all the laps are finished. The screen shows the title of the lap (e.g. tonic flexor phase), the time elapsed since the start of the current lap as well as the total time elapsed since starting the lap watch i.e. the cumulative time elapsed. At the

Figure 1: Screen output of Lap Timer
end, the user can start the lap watch once again or go to the main menu.

4. Lap Timer: This is a multi-step timer in which the user can select finite or infinite cycles, each consisting of several laps up to a maximum of nine. The typical use in the minds of the authors, when providing for this module, was maintenance of time cycle in isolated tissue experiments. In this, Lap 1 can be starting kymograph (or physiograph) and recording control tracing followed by addition of drug and recording of response as Lap 2 and stopping the kymograph, the tissue and allowing the tissue to rest as Lap 3. This cycle would be followed by another cycle starting at Lap 1. To facilitate knowledge of the current phase and the next step, facilities have been provided to give titles (or headings) to each lap and its associated next step (Figure 1), both of which are displayed when the module is used. It is up to the user to keep pace with the lap timer and maintain the time cycle. Facilities for temporary halt of the computer processes would have defeated the purpose of time cycle maintenance and hence, have not been provided for. The infinite steps are useful in the dose-response and dose-selection phases of bioassay, whereas finite steps are useful while recording responses to fixed number of doses e.g. during the latin-square phase of the 4-point bioassay.

5. Toggle Watch: This module has been prompted by the difficulties encountered while recording the immobility time during the ‘forced swimming test’. The major problem faced is that the animal starts and stops swimming several times during the observation period, making time-keeping extremely tedious as the time spent in each immobility/mobility phase has to be recorded. This has been made easier by this module in which there is one timer for measuring total observation period and one stopwatch, which can be toggled on or off by each press of the space bar. It can be used to measure the total immobility time. Total swimming time is calculated as the difference between total time and immobility time and is displayed on the screen. All that the user has to do is to keep a finger on the space bar with full concentration on the animal. Each time the animal starts or stops swimming, the user has to simply tap the space bar. The rest is automatic.

6. Event Counting: This module is meant for counting the number of times an event occurs during a pre-determined period of time e.g. head dipping in the ‘hole board test’ or crossing from one square to another in the ‘open field test’. The user has to first fill in the required observation period in seconds and then has to start the timer by pressing space bar. After that each press of the space bar is counted as an event.

Discussion

This software is as precise as a computer can be, the only tangible source of inaccuracy being the rounding of unnecessary decimal places. The software eliminates the need for alternating the gaze between the stopwatch and the animal/equipment by providing audio signals at appropriate moments e.g. when five seconds are left for a time measurement to be completed. The quality of audio signal would depend upon the sound card being used in the computer. In case it does not permit computer beeps or delays them, the user would be well advised to ignore the same. The space bar has been selected for maximal use as it is the largest key on the keyboard and can be identified even by a novice. The screen output is in large, mostly bold characters so that it is visible even from a distance. The facility of naming the laps in the lap watch and lap timer helps in reminding the worker about the current phase of the experiment. In lap timer, the user is also prompted about the next step which would be due when the countdown timer reaches zero.

The major disadvantage is the need for some computer literacy. The systems are generally not portable but laptop computers can easily be taken to the laboratory. The software is meant for use in computers which are already available and hence, the cost of the computer is irrelevant. The printout of the structure of the database files used and the source code of the program can be obtained, free of cost, from the corresponding author by sending a written request. This will enable the users to customise the software to their needs.

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