

AN EVALUATION OF THE J.O.E.* CEPHALOMETRIC SOFTWARE

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JOE is a computerised cephalometric programme produced and promoted by Rocky Mountain Orthodontics. It is simple to use and prints a static cephalometric case description for diagnostic purposes. Although not greatly endowed with features, it provides a relatively painless and cost effective introduction to computerised cephalometrics.

Developed and promoted by Rocky Mountain Orthodontics, J.O.E. is a computerised cephalometric software package that aids in the assessment of lateral and frontal cephalometric radiographs taken for diagnostic purposes. It permits the recording of clinical information, the sequential digitization of films, their static analysis and measurement, a print-out of results and, finally, storage of data.

The hardware requirements of the system are:

an IBM PC-AT (386 or 486) or clone
1 Mb or RAM (4-8 Mb recommended)
EGA, VGA or super VGA graphics card and monitor
NUMONICS Accugrid, NUMONICS Gridmaster, KURTA XLP, IS/ONE or SummaSketch digitizer
40- Mb hard disk drive (120 Mb or more recommended).

The software requirements are:

MS-DOS 3.0 or above
MICROSOFT WINDOWS 3.0 or above.

The currently available JOE version 3.1 is a Windows-based application that requires this particular Microsoft operating system in order to function. Windows is a graphical user interface that permits instructions and data to be entered into the computer by means of a mouse, icons, menus and dialogue boxes. This, reportedly, makes the computer system easier to use and provides consistency across applications (Horey and Olsen, 1990). Two of Windows' major drawbacks are its slow performance and its high demand on memory in addition to hard disk space, both of which are important considerations when determining hardware requirements.

Windows must be installed on the computer and the digitizer set-up prior

to installing JOE. A cumbersome, but necessary, procedure is the set-up of the digitizer from DOS using an available COM port. From the Windows sub-directory (C:\Windows) the Windows' (Microsoft) mouse driver is changed to the digitizer driver supplied with JOE.

The installation of JOE software is performed from the programme manager screen in Windows and the instructions are clearly presented on the screen and easy to follow from the manual. The process prompts the user and makes the procedure virtually automatic.

After programme loading, the digitizer controls must be set in order to identify the transducers (or pointing devices) and to size the tablet. There is a software protection key attached to the printer port and cable which prevents the use of the digitizer should the software fall into unwanted hands.

The cephalometric programme is started by clicking on the JOE icon in the Windows programme manager. A customization screen then appears which allows the entry of the name of the licensee, the set up of a default analysis, the determination of tracing colours (printer permitting), and the set-up of other individualised cephalometric analyses. Using factors (measurements) available within the programme, JOE has the ability to create an analysis of the operator's choice but only to the limit of the programmed variables.

The operating screen for JOE is very simple and resembles many other programmes that use Windows. This consistent feature across applications presents a screen with a title bar, a menu bar and a toolbar. Both the menu bar and tool bar enable the entry and manipulation of data; and the set-up of

* An acronym for Jiffy Orthodontic Evaluation.

the Windows' desk top as the operator prefers.

Case information entry is performed through the "file" menu which asks for the patient's particulars regarding name, age, race and sex. A secondary "notes" window is useful and may be used for details of the patient's treatment plan, progress, behavioural problems, financial concerns or other relevant data. Closing this window and clicking on the digitizer icon at the top of the tool bar produces a "records information" screen which requests information regarding the cephalograms being used (lateral and/or frontal) and the date and stage of treatment. Data is also requested regarding the teeth present and the arch length discrepancy which has previously been measured on study casts. The programme has, as yet, no ability to do a cast analysis.

Completing the records information screen automatically starts the digitization process. This is a straightforward procedure and on-screen prompts assist the operator. As digitizing occurs, a tracing of the patient appears on a split adjacent screen. The reproduced outline is a facility that has been greatly improved in higher versions of JOE: the original version produced a primitive and inaccurate print-out; versions 2 and higher have had a smoothing function added which makes the tracing appear more representative of the human form. The conclusion of the digitization sequence immediately presents, in several titled windows, the patient's information that is then available for diagnostic interpretation, manipulation, printing and saving.

Cephalometric interpretation is derived from the "analysis" item on the menu bar which permits the selection or change of the cephalometric analysis. JOE has several programmed analyses (Ricketts, Steiner, Jarabak, Clark) although the operator has the facility through the customization process to compile a user-defined analysis.

An essential and extensive item on JOE's menu bar is "help" which provides information not found in the manual. The manual describes the hardware and software installation and set-up procedures while the "help" menu provides definitions and detailed information about the programme's functions. Most areas and items from the

patient information screen to the cephalometric measurement variables, analyses and superimpositions are covered.

The benefits of JOE:

1. The entry of patient information and cephalometric landmarks is quick and easy; and the resultant tracing may have a normal template according to the patient's race, sex and age, superimposed. The applied cephalometric standards are derived from the Rocky Mountain databanks and result in an instant determination of areas that are at variance with normal morphology. The "superimposition" menu items permit the examination of sequential radiographs; and the number of super-imposition reference points and planes have been increased to include Ricketts' five super-imposition areas as well as others commonly used. Although unchangeable, they are sufficiently comprehensive to suit the general needs of diagnostic assessment.
2. A new feature of v3.1 is a "growth estimate". This appears as a drop-down dialogue box under the file menu item and provides a hand/wrist height determination following the entry of the patient's current height and skeletal age assessment.
3. JOE is supported by RMO who have been reliable and efficient in providing assistance whenever necessary.
4. JOE has the ability to digitize a frontal film and overlay a normal template and subsequent films for assessment and comparison.
5. The Windows' clipboard, OLE (object linking and embedding) or DDE (dynamic data exchange), enable the use of patient information in other Windows-based applications. Although JOE has no structured database, information may be incorporated into other data storage programmes for evaluation and statistical analysis. In addition, Microsoft presentation packages allow JOE's data to be made into slides, overheads or other media for case presentations or lectures.
6. A problem list window in JOE (called "Considerations") provides interpretations of the skeletal relations in the transverse, horizontal and

vertical dimensions. Measurements that differ from normal by several clinical deviations identify areas where further diagnostic information or closer examination and possible treatment is required. However, this window needs to be examined critically because it is based on average values which might not favour the individual.

(The following advantages are according to the sales brochure: RMO, 1992.)

7. There are considerable time savings because the tedious task of hand measuring radiographs is eliminated.
8. Clinical practice is enhanced through the use of quality and consistent presentation materials.
9. Patient education and communication are improved by the presentation of tracings and visual norms which identify problem areas. This data may also be sent via the word processor to referring dentists for interprofessional communication.
10. JOE has been designed to be expandable. While at the present time it is a static cephalometric analysis that has little ability to forecast growth and cannot provide an orthodontic nor a surgical prediction, these features may be added in later versions. If these functions are required, digitized case information may be forwarded to Rocky Mountain Diagnostic Services for evaluation via modem or floppy disk.
11. Because of its simple and static nature JOE is economical and perhaps the lowest priced cephalometric programme available. The cost of setting up will be largely dependent on and vary according to hardware requirements. Although a Kurta IS/ONE digitizer is moderately priced, the tablet is opaque and therefore it is necessary to trace a radiograph on an acetate sheet before digitization. Cohen (1984) has suggested that tracings made prior to digitization reduce the reliability of measurements and so direct digitization of the cephalogram, though often difficult, may be preferable. However, this procedure means the purchase of a translucent or clear tablet (Numonics Accugrid)

thereby increasing the cost considerably.

Summary

JOE and other cephalometric programmes have a number of benefits although there is a misconception that the use of computer analysis eliminates the deficiencies of cephalometrics. The inherent problems of the likelihood of error in generating and tracing a head film are still present and the computer digitization process adds further error due to the resolution of the tablet and pointing devices (Mollenhauer, 1990). Perhaps it is appropriate to conclude with a quote from Ricketts (1972) who made a significant contribution to the development of JOE: "A computer can cephalometrically do nothing that the orthodontist cannot do if he is given the time and possesses the knowledge".

References

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