Dialogue management program for the Apple II computer

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Many procedures for allocation of turns to speakers have been advocated for both face-to-face dialogue and teleconferencing (Stodolsky, 1978). Such procedures typically seek to promote a balance in participation through application of fair allocation rules. They sometimes incorporate protected modes of expression, such as anonymous voting, into the dialogue management rules. To encourage concise statements and prompt treatment of a topic or motion, the rules often set limits on how long each person can speak and on the total time for conferencing.

The DIALOG PSD NO CLK (DIALOGUE management with Paddles, Sound, Data, and NO CLock) program for the Apple II+ computer uses an *equal-time resolution rule* to allocate time to speakers, and limits turns and total time to values entered at the beginning of conferencing (Stodolsky, 1981a). The equal-time resolution rule resolves conflicting requests for a turn in favor of the person who thus far has had the least time.

One way to understand the operation of the system is to think of each speaker as having a computer, which in certain conflicts acts as a confidential agent. When many individuals wish to talk at the same time, these agents negotiate to determine which person will speak first. With this program, it is as if the agents compare their clocks, which show how long each person has thus far spoken. The person permitted to speak has the least time on his/her clock, and therefore is the one who has thus far spoken the least.

The transition from speaker to speaker is protected in these cases, since the responsibility for either cutting off an overtime speaker or rejecting a pending request is shared by the group, as opposed to being the sole responsibility of the succeeding speaker, which is the case in unstructured dialogue (Stodolsky, 1981b). This is true for two reasons: First, the group has agreed to use the program to select among conflicting requests. Second, at any contested transition, between one and all of the listeners have requests pending, thus indicating a desire to terminate the turn of the current speaker. Neither the presence of nor the source of a request is revealed if it

is rejected. An accepted request is revealed only when the name of the new speaker appears. The protective mechanism is equivalent to that used by scientific journals that have blind review (author anonymity during the review process). That is, contributors' names are revealed only if they are selected to present their message.

Individuals in groups that used the equal-time resolution rule showed superior task performance and experienced less frustration than did those in groups using a first-in first-out resolution rule. Also, in groups using the equal-time resolution rule, individuals who were fearful of speaking in groups were felt to be group leaders just as often as those who were not fearful (Zimbardo, Linsenmeier, Kabat, & Smith, 1981). Teams working in the telecommunication settings made better decisions, enjoyed themselves more, experienced less frustration, and viewed their teams' decisions more favorably than did face-to-face groups (Linsenmeier & Zimbardo, 1982). These preliminary results are unusual when compared with other work on telephone meetings. Such meetings typically result in greater dissatisfaction and inferior performance than does face-to-face interaction (Weston & Kristen, 1973; Weston, Kristen, & O'Connor, 1975).

The program described here uses standard Apple II game paddles for input requests. Up to four participants can be accommodated if all paddle inputs of the game input/output port are used. Paddles function as binary inputs; the knob is turned completely clockwise to request a speaking turn and completely counterclockwise to relinquish a turn or continue listening to the current speaker. As each new speaker is selected, the speaker's name is displayed and a number of beeps indicating the selected paddle is produced. This simple audio indication eliminates the need for the group to either look at the screen or have a person announce the name of the new speaker. Time remaining is updated at the start of each new turn. The total time for conferencing is also displayed.

After presenting instructions, the program requests the turn limit, the minimum time a person can speak without an interruption. There is no maximum time, since only another's request can interrupt the current speaker. Interruptions are permitted on each occasion that the turn limit is reached, but only by those who have used less time than the speaker. If no interruption occurs, then the current speaker can continue for at least the turn limit again. Finally, the program requests the total time limit for the conference and the number of participants. Each participant's name is then requested. After the final name is entered, the program presents the message, "Waiting for new speaker," or the name of the speaker requesting a turn, and starts timing the session. When the total time for conferencing is exceeded, the program permits the current speaker's turn to expire and then halts conferencing. Finally, it displays the approximate elapsed speaking time of each person.

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Since no clock is used by the program, timekeeping is based upon an input scanning and time-limit checking loop. This procedure maintains an approximately correct interval scale relationship among the speaking times of different individuals, but does not account correctly for waiting periods and thus overall time. A single parameter allows adjustment for different models of the Apple II. Approximate real-time accounting is achieved by altering the loops-to-seconds translation.

The program is written in Applesoft BASIC. The part of the program that collects inputs is isolated in a subroutine. This facilitates increasing the number of speakers permitted, either by use of an operator who enters requests on the Apple II keyboard or by direct inputs from participants through individual keyboards or switches. The display procedures are also isolated, which facilitates utilization of an external display generation device. The program can be used directly as a demonstration of the equal-time resolution rule or incorporated into another system, such as one for multimedia computer-based conferencing, as a module for coordination of turn taking. A comprehensive set of FORTRAN modules used for experiments, which included conditions using the equal-time resolution rule and the first-in first-out rule, were presented by Stodolsky (1976). These assume data storage in the modules for collecting requests. Modules not requiring this deviation from FORTRAN standards are available from the author at cost.

Availability. The BASIC program listing is available without charge. DOS 3.3 copies of this and related programs, which permit operator input for up to 10 persons and use of an interface for direct input for up to 16 persons, are available. They are supplied with programs that permit use of a Mountain Hardware clock (Stodolsky,

1984) and may be obtained by sending a blank diskette to the author.

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