

AUSTRALIA

Patents Act 1990

Section 29(1)  
Regulation 3.1(2)

NOTICE OF ENTITLEMENT

We, DEBORAH LYNN COLLINS  
and  
ANNE SINGLETON BLOCKER

of 333 WEST LAKE AVENUE  
WOODLAND PARK CO 80863 USA  
and  
1422 ARBOR VIEW  
GALVESTON TX 77550 USA

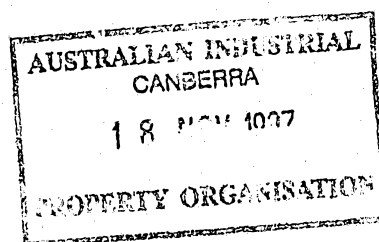
being the applicants in respect of the attached application,  
state the following:-

The persons nominated for the grant of the patent are the  
actual inventors.

DATED this EIGHTEENTH day of NOVEMBER 1997.

PIZZEYS

.....  
BILL BENNETT  
Registered Patent Attorney





AU9526502

(12) PATENT ABRIDGMENT (11) Document No. AU-B-26502/95  
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 692264

- (54) Title  
METHOD AND APPARATUS FOR AUTOMATED LEARNING AND PERFORMANCE EVALUATION
- International Patent Classification(s)  
(51)<sup>6</sup> G09B 005/00
- (21) Application No. : 26502/95 (22) Application Date : 24.05.95
- (87) PCT Publication Number : WO96/37869
- (43) Publication Date : 11.12.96
- (44) Publication Date of Accepted Application : 04.06.98
- (71) Applicant(s)  
DEBORAH LYNN COLLINS; ANNE SINGLETON BLOCKER
- (72) Inventor(s)  
DEBORAH LYNN COLLINS; ANNE SINGLETON BLOCKER
- (74) Attorney or Agent  
PIZZEYS, PO Box 291, WODEN ACT 2606
- (56) Prior Art Documents  
US 4877408  
US 4829431  
US 5002491
- (57) Claim

1. An apparatus for teaching items to a user comprising:

memory means for storing a file of said items;

display means for presenting each item to said user;

input means for receiving a response from said user for each item; and

processor means, responsive to said user's response, for sorting said items into groups of subjectively known items and subjectively unknown items and for generating a sequence of one subjectively unknown item and a plurality of subjectively known items.



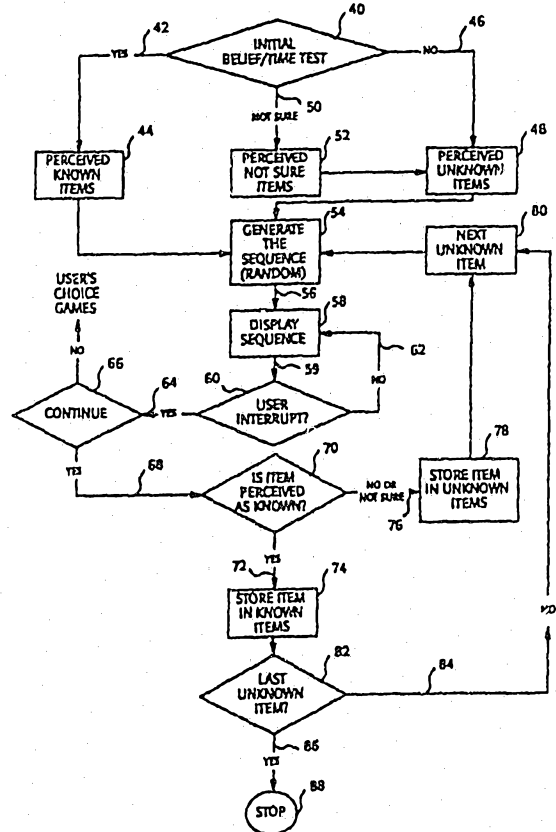
IT

<p>(51) International Patent Classification <sup>6</sup> :  <b>G09B 5/00</b></p>	<p>A1</p>	<p>(11) International Publication Number: <b>WO 96/37869</b>                  (43) International Publication Date: 28 November 1996 (28.11.96)</p>
<p>(21) International Application Number: PCT/US95/06655                  (22) International Filing Date: 24 May 1995 (24.05.95)                  (71)(72) Applicants and Inventors: COLLINS, Deborah, Lynn [US/US]; 333 West Lake Avenue, Woodland Park, CO 80863 (US). BLOCKER, Anne, Singleton [US/US]; 1422 Harbor View, Galveston, TX 77550 (US).                  (74) Agent: CHIAVIELLO, Robert, M., Jr.; Baker &amp; Botts, L.L.P., 2001 Ross Avenue, Dallas, TX 75201-2980 (US).</p>		<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UZ, VN, ARIPO patent (KE, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published                  With international search report.</p> <p style="font-size: 2em; text-align: center;">69 2 2 6 4</p>

(54) Title: METHOD AND APPARATUS FOR AUTOMATED LEARNING AND PERFORMANCE EVALUATION

(57) Abstract

A method and apparatus is provided for automated learning and performance evaluation of a group of items by a user. The apparatus, which can be a digital computer, has an input for receiving a user's response, a display for presenting the material to be learned and logic for sorting the items. The method, which can be practiced on a digital computer, has steps of querying the user as to whether items are believed to be known or unknown, sorting the items into groups of perceived known (44) and unknown (48) items, and generating a sequence (54) of items to be displayed (58). An important feature of this invention is that the user is tested regarding his belief as to whether the item is known or unknown not as to his actual knowledge.



METHOD AND APPARATUS FOR AUTOMATED  
LEARNING AND PERFORMANCE EVALUATION

TECHNICAL FIELD OF THE INVENTION

5 This invention relates generally to an educational  
training teaching tool and more specifically to a method  
and apparatus for automated learning and performance  
evaluation.

BACKGROUND OF THE INVENTION

There are many factors that contribute to the way people learn. These factors include the way in which the information or material is presented (i.e., the teacher),  
5 the way in which the individual processes and recalls information, genetic predispositions toward information processing, multiple forms of intelligence, the repetition rate at which the information is presented, individual attention span, the base of information  
10 already known by the individual, and perhaps most important of all, the individual's learning style and receptivity toward learning and learned material, this includes the role of emotion in learning and performance.

With this in mind then, the design of automated  
15 learning systems is difficult at best. When these systems are to be applied to the general public having diverse backgrounds and cultural differences the problem becomes monumental. This problem is not just associated with "classroom" situations but with electronic games,  
20 military and corporate training, remedial education, coaching and a myriad of other teaching, selling, public education, learning and therapeutic situations.

Accordingly, a need exists in the art for an automatic teaching system and learning method which  
25 adjusts for learning speed, learning style, cultural differences and previously learned material and which allows a student to be receptive over extended periods of time to the material to be learned.

A need also exists in the art for taking any  
30 material to be learned and presenting that material to a student or user in an order and manner tailored to the learning receptivity of that student or user and in a pattern easily assimilated by that student.

A further need exists for a performance method which  
35 provides a specific quantitative measurement of the

student's confidence level and self-esteem for specific learned material independent of that student's knowledge of the material.

SUMMARY OF THE INVENTION

In one embodiment of the invention an apparatus is provided for teaching a group of items to a user or evaluating performance of the user. The apparatus  
5 comprises means for displaying each of the items to the user. The apparatus further comprises means for receiving a response from the user and logic means, responsive to the user's response, for sorting the items into two  
10 groups of known and unknown subjective items. The apparatus further comprises means for generating a sequence of subjective items, including at least one each of the known and unknown subjective items, and supplying the sequence to the display means.

A technical advantage of the apparatus of the  
15 present invention is that a group of items can be learned faster and more completely with better retention. Another technical advantage is that boredom is used advantageously in the learning process. Another  
20 technical advantage is that the receptivity of the user is improved by employing high repetition rates for newly learned facts. It is still a further technical advantage of the invention that there is provided an apparatus which creates a pattern of known and unknown material and which adjusts the pattern to suit the individual user.  
25 It is still a further technical advantage of the invention to provide an apparatus for individualized instruction from a single set of material, customized for each individual student or user that can be taught in a way best enabling a student to learn the material.

30 In another embodiment of the invention a method is provided evaluating performance of a user or for teaching to a user a group of items where each of the items is paired to a specific response. The method includes the following steps performed in this or a different order:  
35 One, the user is queried as to whether each item in the

group is known or unknown. Two, the group of items are sorted into a first group of known subjective items and a second group of unknown subjective items. Three, a sequence of the subjective items is generated including at least one each of the known and unknown subjective items. Four, the sequence of subjective items is displayed in the following manner: If the item is an unknown subjective item, then the item and its paired response are displayed together, if the item is a known subjective item then the item is displayed at a first time and the paired response is displayed at a later time.

One technical advantage of the invention is that a method is provided for teaching to a user a group of items where each of the items is paired to a specific response. Another technical advantage of the method of the present invention is that the items and their paired responses are sorted into groups of known and unknown material based on a user's subjective response. Still another technical advantage of the method in accordance with the present invention is that the material is displayed to the user in such a way that unknown items are presented with their paired response at the same time while known items are displayed first while the paired response is displayed at a later time.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

5

FIGURE 1 illustrates a block diagram of a prior art system using repetition for instructional purposes;

10

FIGURE 2 illustrates a block diagram of one embodiment of a method in accord with the present invention;

FIGURE 3 illustrates a block diagram of a second embodiment of a method in accord with the present invention;

15

FIGURE 4 illustrates a block diagram of an interrupt sequence used in connection with the method of the present invention;

FIGURE 5 illustrates a block diagram of a third embodiment of the method in accord with the present invention;

20

FIGURE 6 illustrates a first embodiment of an apparatus of the present invention showing different displays of known and unknown items in accord with the learning method of the present invention; and

25

FIGURE 7 illustrates a second embodiment of an apparatus of the present invention and for practicing the methods of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Using repetition for instructional purposes is well-known in the prior art. Such methods are used for learning associated terms like vocabulary words, a foreign language, names and numbers. Each of the items to be learned has an associated paired response. In the prior art, the material may be presented either in print or electronically as a set of flash cards or visual display screens with a question and answer (a fact and a definition) all in the form of a selected item and paired response.

In one prior art method using a set of flash cards, the flash cards are separated into separate groups or sets of flash card chunks to be learned. The information is learned one chunk at a time by simply studying the cards and performing self-tests. Cards that are tested correctly are set aside while cards that are tested incorrectly are repeated until learned. When one group or chunk is learned, another group is studied until that group is learned. The process continues until all cards in all groups are learned.

In another prior art method, the items to be learned are separated by a test into groups of known and unknown items. The user then focuses on studying and repetitive learning, including the self-testing process, of the unknown items. As an unknown item is learned, it is transferred to the known items until all unknown items are learned.

In another prior art method shown in FIGURE 1, a group of items to be learned is separated by an initial test 2 into two groups of known items 4 and unknown items 6 based on the user's actual knowledge, not his perceived knowledge. Once the items have been separated into the two groups, a sequence of known and unknown items is generated at a sequence generator 8. Each of the items

in the sequence is then presented on a display 10 and then tested 12.

The user is then presented with the test item and required to give a response at step 13. The response is  
5 evaluated at decision point 14. If the answer is correct, then the method follows along the path 16 and the item is then stored 18 in the collection of known items 4 and the next item in the sequence is incremented at step 20 and the process continues.

10 If the response evaluated at decision point 14 is incorrect, then the method follows along path 22 to step 24 where the user is provided the answer or paired response to the item. The process continues and at step 26 the item is stored in the collection of unknown items  
15 6. At step 28 the sequence is incremented and the next item in the sequence is displayed. Returning to decision point 14, if the item is known, the method determines at step 30 whether the item is the last item to be learned; if it is, the process stops at step 32, if not, and there  
20 are items remaining, the process continues along path 34 and the next item in the sequence is incremented and the process continues.

In one embodiment of the present invention shown in FIGURE 2, a method is provided that separates the items  
25 to be learned or for use in measuring performance into three groups based entirely on the user's perception of whether he knows the item not on the basis of whether the item is actually known or unknown. It should also be understood that the terms "known" and "unknown" represent  
30 a relative multilevel degree of knowledge and not an absolute binary knowledge. It should also be understood that any perceptible factor can be substituted for the known and unknown items described in the preferred embodiments. For example, this invention can be used to  
35 test for use or nonuse. A further refinement of the

sorting process sets a time limit for receiving the user's subjective response. In this method, beginning with step 40, the user is provided with an item and given an initial test as to whether he believes he knows the answer or not. Also, there is a clock running, unseen and unknown by the user, that times the response. It should be emphasized that in this test, the user is asked whether or not he knows the item, not tested on the item. If the user states that the answer is known, then the process follows path 42 and the item is stored in the perceived known items category 44. If the user responds that the item is not known, the process follows path 46 and the item is stored in the perceived unknown items category 48. If the user responds that he is not sure whether the item is known or unknown, then the process follows path 50 and the item is stored in the perceived not sure items category 52. It is also noted that if the user fails to give a response within the predetermined time period, then the item is treated as an unknown item and stored in perceived unknown items category 48. The perceived not sure items in category 52 are combined with the perceived unknown items in category 48 and are called subjectively unknown items. The subjective unknown items together with the perceived subjective known items are directed to sequence generator 54 which creates a sequence or list of unknown and known subjective items.

In the preferred embodiment, the sequence will include at least one unknown item and a plurality of randomly selected known items. The subjective unknown items can be thought of as arranged in order from 1 to N where N is the total number of subjective unknown items. The sequence generator 54 selects the first subjective unknown item and combines that with the randomly selected subjective known items to generate the sequence. Once the sequence is generated, the process follows along path

56 and the first item in the sequence is then displayed to the user by display 58. The method will continue displaying each item in the sequence until such time as a user interrupt occurs. The item can be displayed  
5 visually or auditorily in a variety of ways including animation, color adaptation, repetition, position, dimensional, sound and rhythm. In this way there is a continued repetitious presentation of the subjective unknown item along with randomly selected subjective  
10 known items.

Now following along path 59 to user interrupt 60, the method determines whether the user has chosen to interrupt the presentation. If not, the process follows path 62 and returns to display 58 where the next item in  
15 the sequence is presented. If there is a user interrupt detected at user interrupt 60, the process follows path 64 to decision block 66 where the method determines whether the user should continue with the current sequence or divert to other activities. If the method  
20 continues with the current sequence, the process follows path 68 to decision block 70. At decision block 70, the user is queried about the item and is asked whether the item is perceived as known or unknown. Again, this is a subjective test only. If the item is perceived known,  
25 the method follows path 72 and the item is stored at step 74 in perceived known items 44. After the item is stored at step 74, the method checks at decision block 82 to see whether the unknown item is the last unknown item. If the item is not the last unknown item, the method follows  
30 path 84 to next unknown item selector 80 which selects the next unknown item and passes control to sequence generator 54 for generating new sequence. Returning to decision point 82, if the unknown item was the last unknown item, then the process follows path 86 and stops  
35 at point 88.

Returning to decision point 70, if the item is perceived as unknown, or the user is not sure whether the item is known or unknown, the process follows path 76 and the item is stored at step 78 in perceived unknown items 5 48. After the item is stored, the next unknown item is selected at next unknown item selector 80 and a new sequence is generated by sequence generator 54.

Referring now to FIGURE 3, an alternative embodiment of the method in accord with the present invention is 10 shown. In this method, each of the items in a group of items to be learned has an associated paired response. In initial step 90, the user is queried as to whether he believes he knows the item and its paired response. The user is not asked to give or provide the paired response 15 at this time. Also the response is timed and if a response is not given within a predetermined time T, then the item and its paired response are treated as a perceived unknown item. If the user responds that he knows the item and its paired response, the process 20 follows path 92 and the item with its associated paired response is stored in an array 94 labeled perceived known items. If the user fails to respond within time T or responds that the item is not known, then the process follows path 96 and the item is stored in array 98 as a 25 perceived unknown item. If the user responds that he is not sure whether the item is known or unknown, the process follows path 100 and the item is stored in array 102 as a perceived not sure item. The items in arrays 98 and 102 are combined in a single table of unknown items.

30 When all the items in a group of items to be learned have been sorted into the various arrays, the process continues to the step of generating a sequence of subjective items. Sequence generator 104 produces a sequence or list of perceived known items and perceived 35 unknown items. In the preferred embodiment the sequence

generally consists of a single perceived unknown item and a plurality of randomly selected perceived known items. Once the sequence has been generated by sequence generator 104, the first subjective item in the sequence is selected at item selector 106.

5 At anytime after the item is selected, the user is permitted to interrupt as shown at step 108. If there is no user interrupt, the process follows path 110 to determine whether the selected subjective item is a  
10 perceived known or perceived unknown item at step 112. If the item is a perceived unknown item, then the process follows path 114 and both the item and its paired response are displayed to the user simultaneously at display 116. After the item and its paired response are  
15 displayed at step 116, the list of sequenced items is incremented and the next item is incremented at step 118. If the item selected at step 106 is a perceived known item, then the process follows path 120. The perceived  
20 known item is displayed at display item step 122 at a first time. Then at a later time, the associated paired response is displayed to the user at display paired response step 124. After the associated paired response is displayed at step 124, the list of sequenced items is incremented by the next item at step 118. After the  
25 sequence has been incremented, the process determines at step 126 as to whether the sequence is completed, if not, then the process follows path 128 and the next item is presented. If the item is the last item in the sequence, then the process follows path 130 and a new sequence of  
30 subjective items is generated by sequence generator 104.

One unique feature of the method of the present invention is the novel way it permits the user to interrupt the learning process at any time. Still referring to FIGURE 3, if a user interrupt is detected at  
35 step 108, the method branches along path 132 to FIGURE 4.

Referring now to FIGURE 4, the unique interrupt feature of the present invention is described. Decision box 140 is activated at the step in the process of FIGURE 3 shown at 108. If the system determines that the user has  
5 actually activated the interrupt, the process follows path 142 and the user is queried at decision block 144 as to whether he wishes to begin a new sequence or not. If the user selects to initiate a new sequence, the process branches through path 146 back to sequence generator 104  
10 (FIGURE 3). Sequence generator 104 is activated to select a new unknown and generate a new sequence for continuing the method. If the user decides not to select a new sequence and responds NO, the process may follow path 148 and the user is queried at game step 150 as to whether he  
15 wishes to divert his attention. If yes, the process branches to a set of games that are specifically designed to help alleviate boredom, improve the user's attention span or teach some other aspect of the paired association such as exact spelling. There can also be games of any  
20 conventional sort such as Hangman, etc. If the user decides not to select a game, the process continues down path 152 and the user is at step 154 asked whether he would like a different test or different learning scheme such as the performance evaluation illustrated in FIGURE  
25 5. If the user answers YES, the process branches to the new Test. If the user responds NO, then the method stops.

Returning now to user interrupt 140, should it be determined that it was not the user that interrupted the  
30 method, the process follows path 156 and determines at timer 158 whether the timer timed out. In one embodiment, the method is provided with a timer to measure the user's response time. It also functions, when used in connection with a stored program digital  
35 computer and display, to time out automatically and stop

in the event that the user is no longer working with the device. In another embodiment, timer 158 can be a counter used to measure cycling by counting the number of times an unknown has been repeated. If the user is cycling too fast, the method can automatically initiate new sequence 144 or different testing 154. If the user is cycling too slowly, the method can branch to a prescriptive game 150 or other activity. If timer 158 has timed out, then the process follows path 160 and returns to decision point 144 and may ask the user whether he wishes to choose a new sequence. If it is determined that the timer has not stopped, the process follows path 162 and the sequence is restarted at step 164 and the process continues.

Referring now to FIGURE 5, another embodiment of a method in accordance with the present invention is described directly related to evaluating performance. Beginning at step 180, a sequence of items is generated and presented to the user one item at a time at test perception step 182. In step 182, the user is asked whether he knows the item, whether he does not know the item or whether he is not sure if the item is known or unknown. Again, it must be emphasized that what this invention seeks to determine is not whether the item is actually known or unknown, but whether the user believes the item is known or unknown.

If the user responds at step 182 that he does not know the item, the process follows path 184. At step 186, a perception flag is set, in this case a "U" for unknown. If the user responds that he does know the item, the process follows path 188 and the perception flag is set to "K" for known at step 190. If the user responds that he is not sure whether the item is known or unknown, the process follows path 192 and the perception flag is set to "U" for unknown at step 194.

After the perception flag has been set, the item is presented to the user and he is queried as to his actual knowledge of the item. This occurs at reality test step 196 where the user is asked to provide an appropriate response. If the response is incorrect or wrong, the process follows path 198 where the perception flag is tested at step 200. If the flag was set to U, the process follows path 202 and the UU counter is incremented by one at 204. If the perception flag is set to "K", the process follows path 206 and the "KU" counter is incremented by one at step 208.

Returning to test block 196, if the user provides the correct or right response, the process follows path 210 and the perception flag is tested at step 212. If the perception flag had previously been set to "K" for known, the process follows path 214 and the "KK" register is incremented by one at step 216. If the perception flag was set to "U", the process follows path 218 and the "UK" register is incremented by one at step 220. After the appropriate registers have been incremented in steps 204, 208, 216 and 220, the process determines whether the item is the last item in the sequence at counter 222. If it is the last item in the sequence, the process moves along path 224 to performance rating step 226. If the item is not the last item, the process follows path 228 and at step 230 the sequence of items is incremented by one and returned along path 232 to test perception block 182. One method of rating or evaluating performance is to divide the sum of registers 204 and 216 by the sum of registers 204, 208, 216 and 220 expressing the result as a percentage referred to as a current measure of knowledge. Another performance evaluation is calculated by taking one minus the sum of registers 208 and 220 divided by the sum of registers 204, 208, 216 and 220 expressed as a percentage referred to as a measure of

performance ability. Other performance rating calculations are well-known to those of ordinary skill in the art.

Referring now to FIGURE 6, an apparatus for practicing the invention is shown as a wrist-mounted computer with a visual display. It should also be known that the display can be either an audio annunciator or the combination of a visual and audio display. Referring to FIGURE 6, the improved learning apparatus is shown generally at 300 and consists of a housing 302, a display 304, ports 306 and 308 that interface an external general purpose computer with the internal computer or microprocessor (not shown). Function switch 310 is used to control apparatus functions such as ON/OFF. Shown generally at 312 are the input devices which can be standard pressure sensitive switches labeled "Unknown" 314, "Not Sure" 316 and "Known" 318.

Not shown in FIGURE 6, but well-known to those having ordinary skill in the art, is a conventional computer system or microprocessor possessing standard processing, memory and I/O functions. In the memory would be stored a list or file of data consisting of the items or a group of items to be taught to the user. In this case, shown on display 304 are the two names of a drug, the tradename and its generic name (the item and its paired response). Display means 304 flashes the item 320, in this case the word, "amoxil", and the paired response 322 beneath it in this case the word, "penicillin".

After the item 320 and its paired response 322 are flashed and presented on display 304, switches 314, 316 and 318 are activated as means for receiving a response from the user. If the user believes that he knows the association between amoxil and penicillin, he depresses "Known" switch 318. If, on the other hand, the user

does not know the relationship, he depresses "Unknown" switch 314. If the user is unsure as to whether the relationship is known or unknown, he presses "Not Sure" switch 316. Using standard computer techniques, the  
5 input from switches 312 is fed to the logic means of the microprocessor which labels the item as "Known" if switch 318 was activated by the user or "Unknown" if either switches 314 or 316 are activated by the user. The system continues displaying the various items 320 with  
10 the associated paired response 322 and querying the user for his perception until the list of items is completed. Once the list or sequence is completed, the microprocessor, through its stored program, generates a new list or sequence of the items to be learned,  
15 including at least one each of the known and unknown subjective of items.

Still referring to FIGURE 6, there are shown three separate displays 304A, 304B and 304C illustrating how the items 320 and the paired response 322 are presented  
20 to the user in a sequence. Beginning with 304A, both the unknown item 320 with its paired response 322 is shown on the display. At anytime after the first unknown is displayed more than once, the user can activate any of switches 312 to interrupt the process. Once unknown item  
25 320 is displayed with its paired response 322, the system presents a known item 326 on display 304B. After a suitable time delay, the paired response 328 to item 326 is displayed together and presented to the user on display 304C.

30 Referring now to FIGURE 7, an alternative embodiment of an apparatus in accordance with the present invention is shown generally as computer 400. Similar to the computer shown in FIGURE 6, this computer employs a standard microprocessor with conventional internal  
35 arithmetic and logic functions, conventional I/O handling

and off-chip memory in RAM, ROM or other suitable memory device. As these items are well-known to those persons of ordinary skill in the art, they are not shown. Referring now to computer 400, there is a display 402  
5 which in the preferred embodiment is a liquid crystal display for presenting an item 404 and its associated paired response 406 to the user. In this case, the item 404 is material not known or believed to be not known by the user and referred to as unknown material. At input  
10 pad 408, various input devices are shown consisting of conventional pressure activated switches 410, 412 and 414 for receiving a user response. Switch 410 indicates that the user perceives he does not know the item. Switch 412 indicates that the user is not sure whether  
15 the item is known or unknown and switch 414 indicates that the user perceives he does know the item. Also shown is keyboard 416 consisting of a full set of alpha numeric keys as well as various control keys. Keyboard 416 permits for vastly increased user input. For  
20 instance, in one embodiment of the invention, the user is permitted at anytime to interrupt the learning process and activate a game or another learning module. For instance, by activating the enter key 418, the process of displaying the group of items would be halted and the  
25 user would be asked whether he wished to continue, start the sequence over, use a new sequence, play a game or some other activity.

In an alternative embodiment of computer 400, a method in accord with the present invention is contained  
30 on external memory. The external memory can be any of the type such as a floppy disk (both 5 1/4" and 3 1/2" varieties) a card or other chip type memory such as RAM or ROM. In this embodiment, a device is provided for configuring computer 400 to perform either a method of  
35 teaching a user or evaluating user performance by

presenting a group of items. The device has means for configuring input pad 408 to query the user as to whether an item is perceived known or unknown. The device has means for configuring the processor of computer 400 to  
5 sort each of the items into a group of perceived known items and a second group of perceived unknown items. The device also has means for configuring the processor of computer 400 to generate a sequence of subjective items including at least one of said first group and one of  
10 said second group. The device is provided with means for configuring display 402 with the sequence of the subjective items. The configurations described are preferably made by stored program instructions as is well-known to those of ordinary skill in the art.

15 The computers described in FIGURES 6 and 7 can operate under a set of stored instructions written in accord with the various embodiments of the method shown.

From the above description it will be seen by those having ordinary skill in the art that under the present  
20 invention, a method and apparatus is provided that focuses on the user's perceived knowledge of an item and does not require the user to actually know the item. In this way, improved automated learning and performance evaluation can be achieved. Since the invention may be  
25 incorporated into a microprocessor based stored program digital computer or a removable storage device, a wide variety of learning methods may be provided. While the invention has been particularly shown and described with reference to a preferred embodiment, it will be  
30 understood by those of ordinary skill in the art that various other changes in form and detail may be made without departing from the spirit or scope of the invention.

WHAT IS CLAIMED IS:

1. An apparatus for teaching items to a user comprising:

memory means for storing a file of said items;

display means for presenting each item to said user;

input means for receiving a response from said user for each item; and

processor means, responsive to said user's response, for sorting said items into groups of subjectively known items and subjectively unknown items and for generating a sequence of one subjectively unknown item and a plurality of subjectively known items.

2. The apparatus of Claim 1, wherein said display means is a visual display.

3. The apparatus of Claim 1, wherein said display means is an audio display.

4. The apparatus of Claim 1, wherein said input means further comprises three switch means indicating whether said user knows the item, does not know the item or is not sure of whether the item is known or unknown.

5. The apparatus of Claim 1, further comprising means for timing.

6. The apparatus of Claim 5, wherein said timing means measures the time of said user's response.

7. An apparatus for teaching a group of items to a user comprising:

5 means for displaying each of said items in said group to said user;

means for receiving a response from said user associated with each of said items;

10 means responsive to said receiving means and for sorting said items into a group of known subjective items and a group of unknown subjective items; and

15 means for generating a list of said subjective items in a sequence including in said list at least one each of said known and unknown subjective items and supplying said list to said display means.

20 8. The apparatus of Claim 7, wherein said list has one unknown subjective item and a plurality of known subjective items.

25 9. The apparatus of Claim 8, wherein said known subjective items are randomly selected.

10. An apparatus for teaching a group of items to a user where each of said items has a paired response, said apparatus comprising:

5 means for displaying each of said items in said group to said user and for soliciting a response from said user;

means for receiving said response from said user;

10

logic means responsive to said receiving means and for sorting said items into two groups of known subjective items and unknown subjective items; and

15

means for generating a sequence of said subjective items including in said sequence at least one unknown subjective item and a plurality of known subjective items and supplying said sequence of items to said display means along with said paired response.

20

11. The apparatus of Claim 10, wherein said sequence has a predetermined order of said unknown subjective item and said plurality of known subjective items.

25

12. The apparatus of Claim 10, wherein said sequence includes at least one repetition of said unknown subjective item.

30

13. The apparatus of Claim 10 further comprising means for controlling presentation of said sequence of items and paired responses by said display means.

14. The apparatus of Claim 13, wherein said controlling means presents said unknown subjective item together with its paired response.

5           15. The apparatus of Claim 13, wherein said controlling means presents said known subjective item at a first time and presents its paired response at a later time.

10           16. A method for teaching to a user a group of items where each of said items has a paired response, said method comprising:

                  querying said user as to whether an item is perceived known or unknown;

15

                  sorting each of said items into a first group of perceived known items and a second group of perceived unknown items;

20

                  generating a sequence of subjective items including at least one of said first group and one of said second group; and

25

                  displaying said sequence of subjective items with said respective paired response.

30

17. The method of Claim 16, wherein said sequence of items and paired responses are displayed differently depending on whether said item is taken from said first group or said second group.

35

18. The method of Claim 17, wherein items of said first group are displayed separately from said paired responses.

19. The method of Claim 17, wherein items of said second group are displayed together with said paired responses.

5           20. The method of Claim 16, further comprising the step of determining whether the user wishes to continue.

10           21. The method of Claim 16, wherein said querying step also queries said user as to whether said user is not sure of said item being known or unknown.

15           22. The method of Claim 21, wherein said second group includes items where said user is not sure of said item being known or unknown.

23. An apparatus for evaluating performance of a user comprising:

memory means for storing a file of items;

display means for presenting each item to said user;

5 input means for receiving a response from said user for each item as to whether the item is perceived known or unknown; and

processor means, responsive to said user's response, for sorting said items into groups of subjectively known  
10 items and subjectively unknown items and for generating a sequence of one subjectively unknown item and a plurality of subjectively known items.

24. The apparatus of Claim 23, wherein said display  
15 means is a visual display.

25. The apparatus of Claim 23, wherein said display means is an audio display.

20 26. The apparatus of Claim 23, wherein said input means further comprises three switch means indicating whether said user knows the item, does not know the item or is not sure of whether the item is known or unknown.

27. A device for configuring a digital computer to perform a method of teaching a user or evaluating user performance by presenting a group of items where said computer has an input means, a processor and a display, said device comprising:

means for configuring said input means to query said user as to whether an item is perceived known or unknown;

means for configuring said processor to sort each of said items into a group of perceived known items and a second group of perceived unknown items and to generate a sequence of subjective items including at least one of said first group and one of said second group; and

means for configuring said display to present said sequence of subjective items.

28. The device of Claim 27, wherein said device is packaged as a memory card.

29. The device of Claim 27, wherein said device is packaged as a floppy disk.

30. The device of Claim 27, wherein said device is packaged as a read-only memory.

31. The device of Claim 27, wherein said device is an optical memory.

32. The device of Claim 27, wherein said device is an integrated circuit.

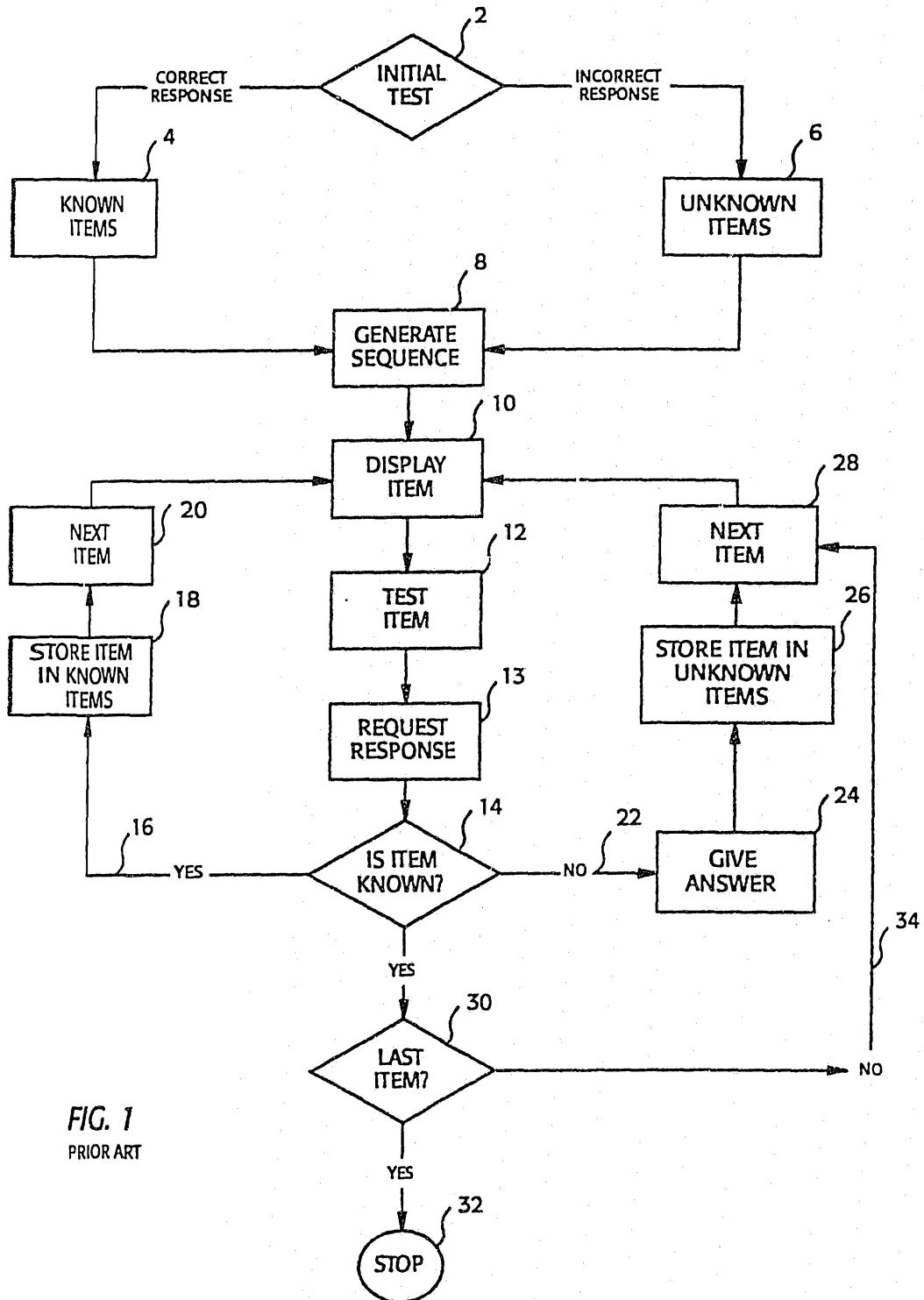


FIG. 1  
PRIOR ART

26502/95

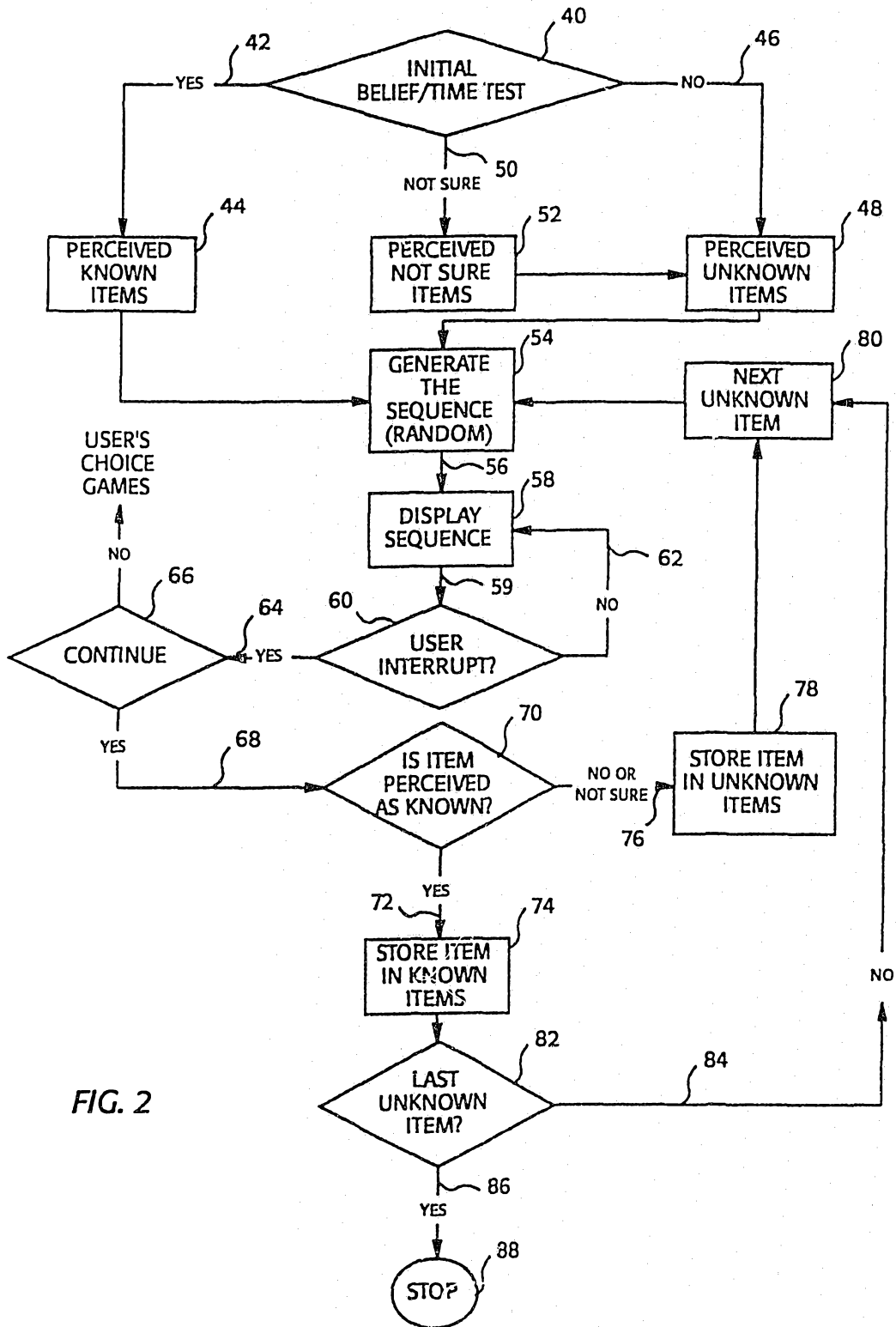


FIG. 2

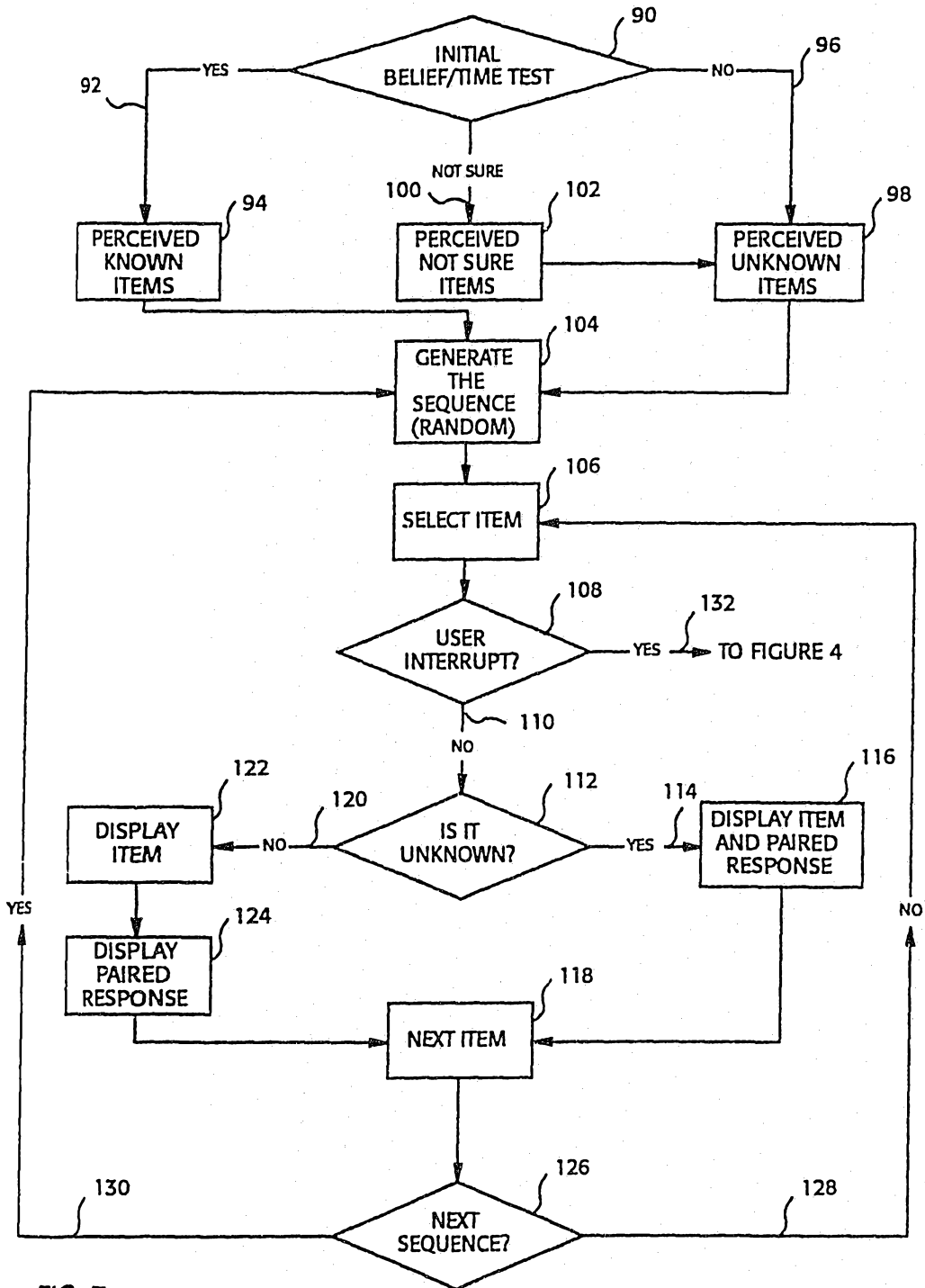


FIG. 3

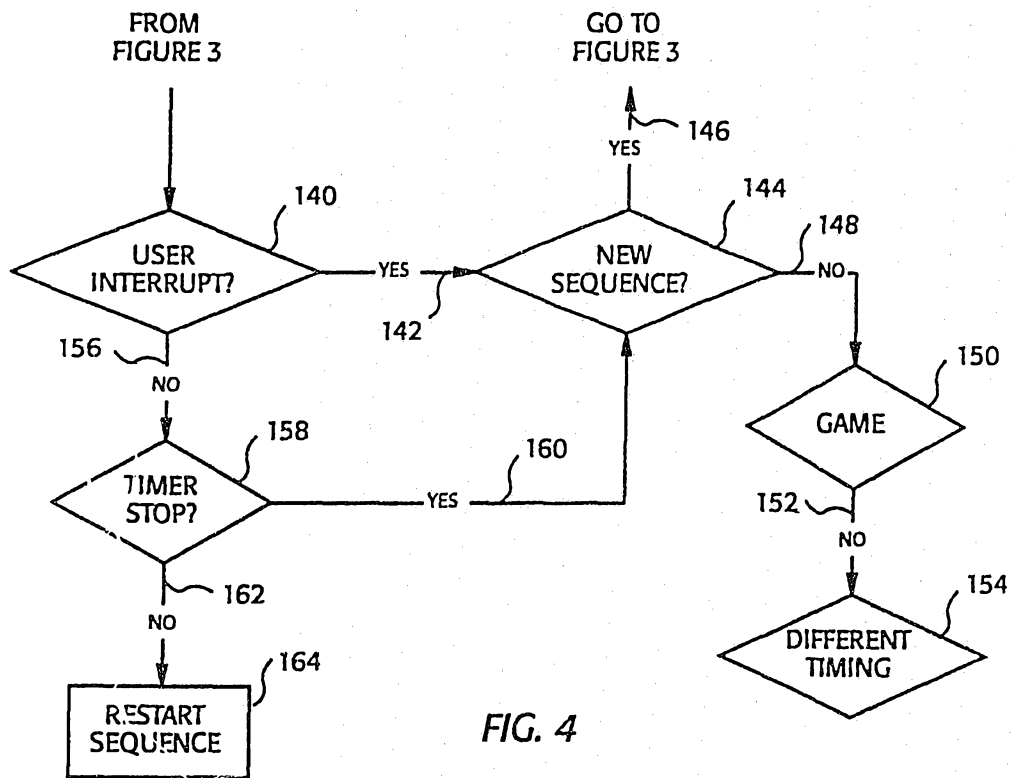


FIG. 4

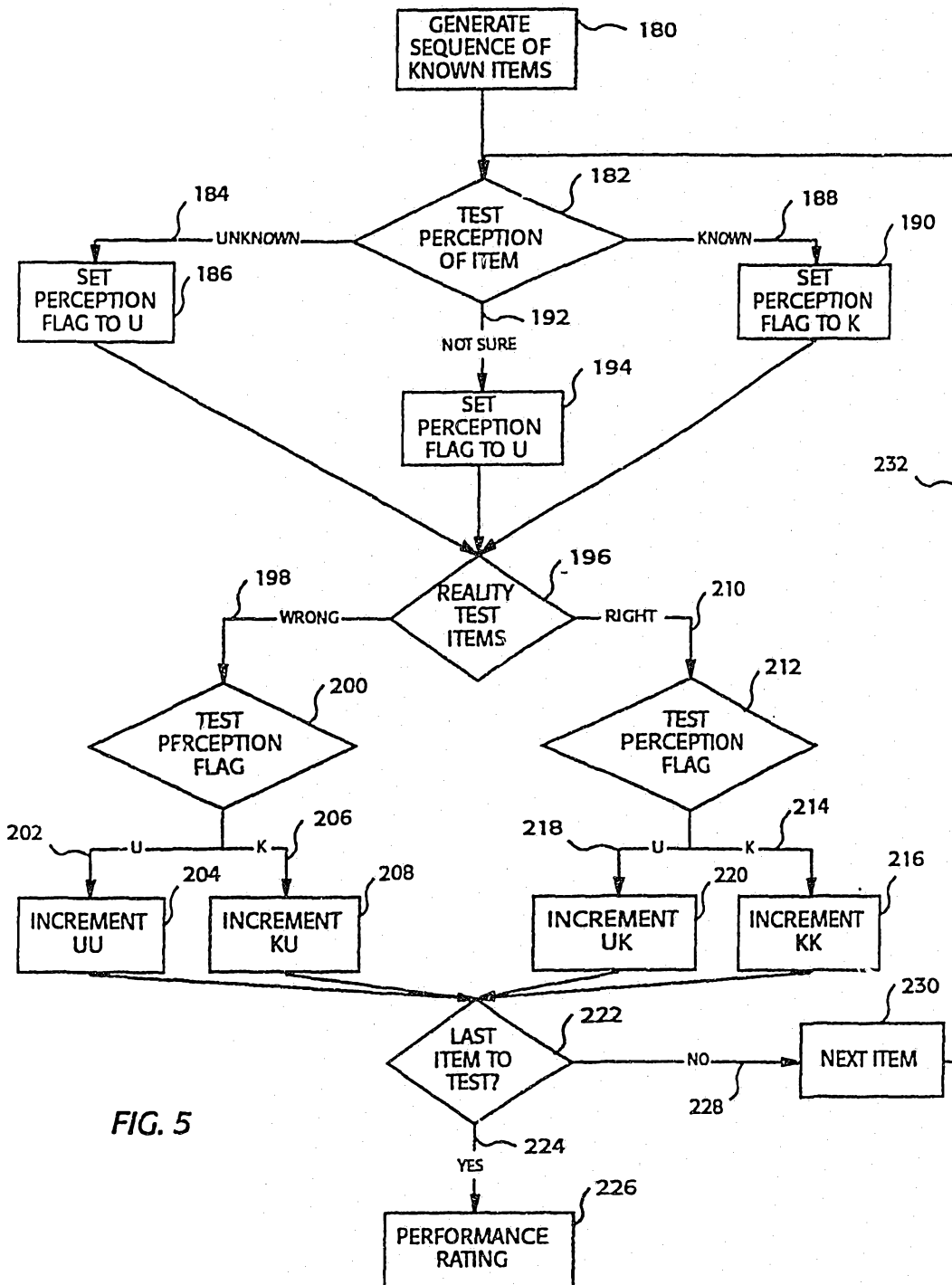


FIG. 5

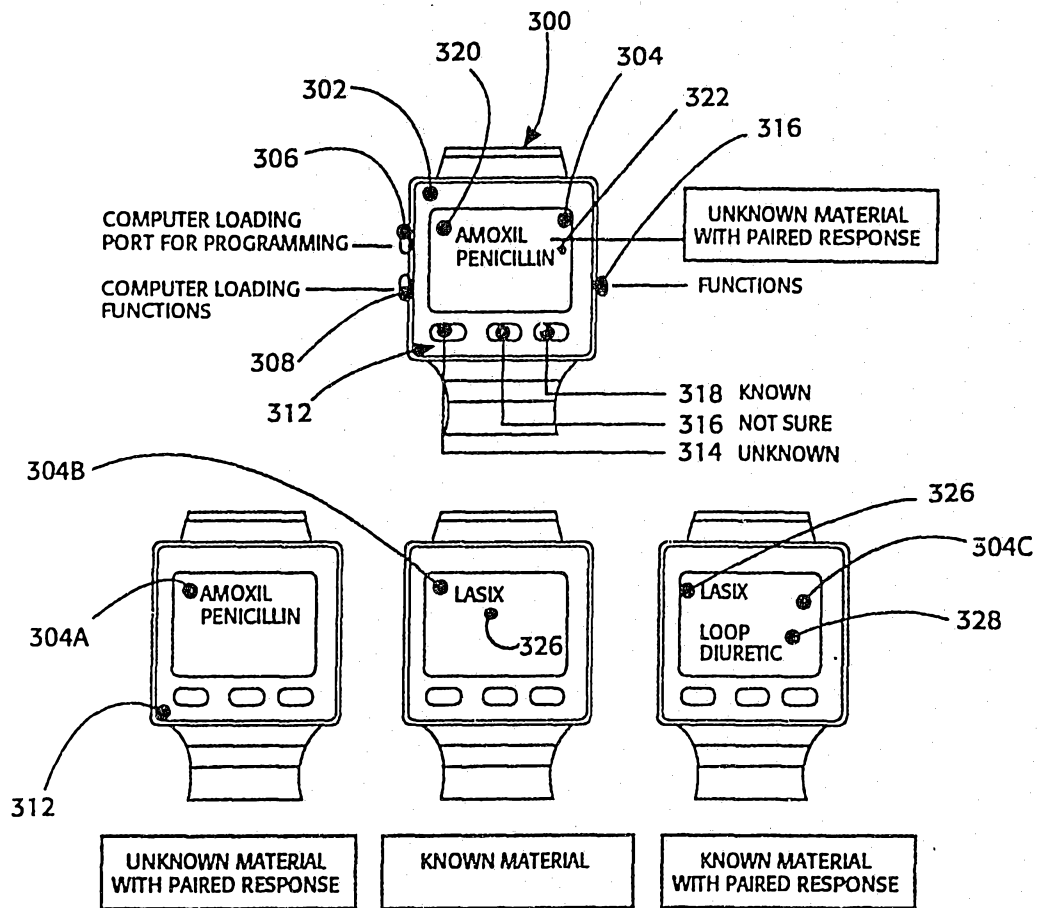


FIG. 6

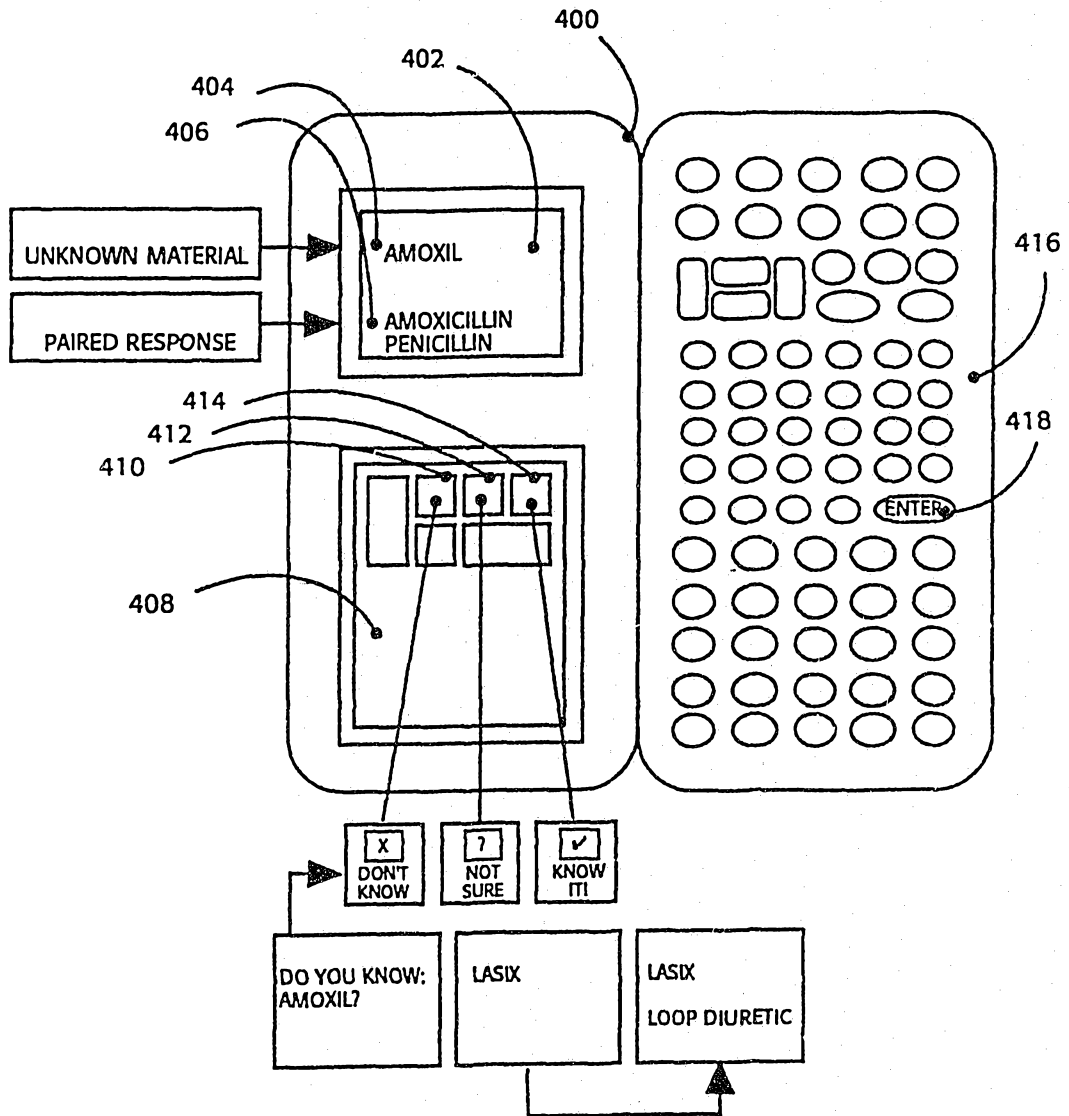


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/06655

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(6) :G09B 5/00 US CL :434/322		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
U.S. : 434/322, 323, 335		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
NONE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
NONE		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,877,408 (HARTSFIELD) 31 October 1989, see entire document.	1-32
A	US, A, 4,829,431 (OTT ET AL.) 09 May 1989, see entire document.	1-32
A	US, A, 5,002,491 (ABRAHAMSON ET AL.) 26 March 1991, see entire document.	1-32
A	US, A, 5,035,625 (MUNSON ET AL.) 30 July 1991, see entire document.	1-32
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: -A- document defining the general state of the art which is not considered to be part of particular relevance -E- tertiary document published on or after the international filing date -L- document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified) -O- document referring to an oral disclosure, use, exhibition or other means -P- document published prior to the international filing date but later than the priority date claimed		T- later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention X- document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone Y- document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art G- document member of the same patent family
Date of the actual completion of the international search		Date of mailing of the international search report
26 AUGUST:1995		13 SEP 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231		Authorized officer
Facsimile No. (703) 305-3230		GLENN RICHMAN <i>Stacia Simcik for</i>
		Telephone No. (703) 308-3170