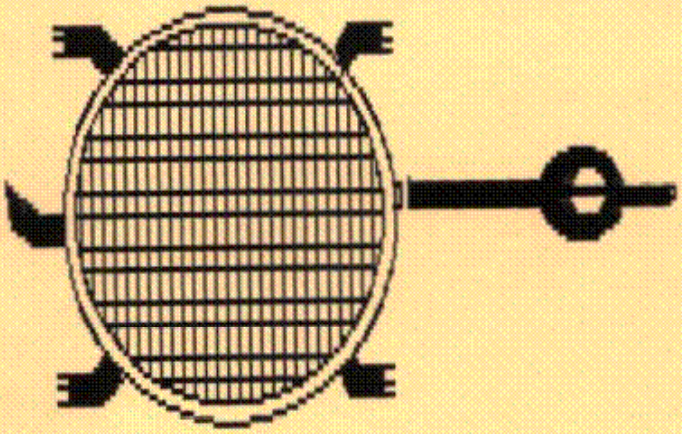
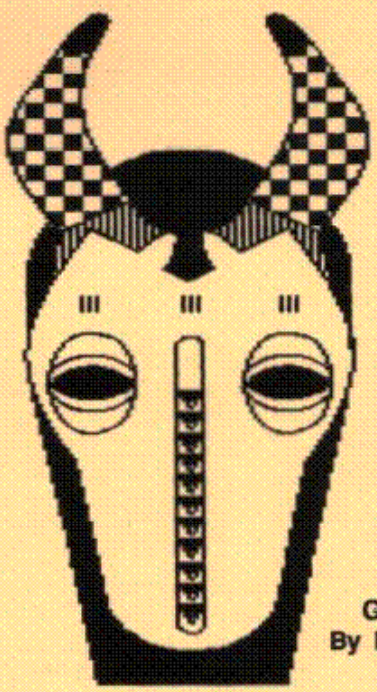
Journal of the ISTE Special Interest Group for Logo-Using Educators

LOGO EXCHANGE

April 1991 Volume 9 Number 7

Carved turtle design on Senufo wooden door
Ivory Coast, Mali, Upper Volta
By Frances Elliot
New York City





Zamble mask
Guro, Ivory Coast
By Benita McDougal
New York City

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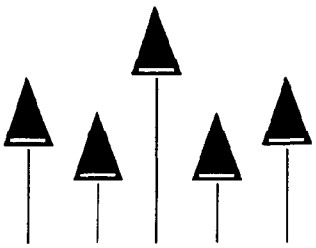

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SHUFFLE:

A Logo Primitive to Rearrange the Items in a List

by Charles Crume

Two of Logo's more powerful features are recursion and the ability to work with words and lists. These capabilities make it is easy to write Logo programs that present each item in a list. For example, one could display the following list of fruits:

```
[APPLE BANANA BLACKBERRY PEAR PLUM
   ORANGE]
```

and ask a child to enter the color of each fruit as its name is displayed.

However, once a child uses such a program several times he or she may begin to remember the order in which the fruits are presented and the corresponding answer. This would probably reduce the usefulness of the program. Rearranging the elements of the list every time the program is run would inject a degree of randomness and help prevent the child from remembering which answer comes next. Although most dialects of Logo contain a random number function to generate random numbers, no dialect contains a primitive to rearrange the elements of a list randomly. This article presents such a primitive.

There are, in fact, many real-life instances in which the same list of items appears in a different order each time the items are encountered. A prominent example would be a deck of playing cards. A deck of cards consists of four suits (hearts, diamonds, clubs, and spades) with each suit containing the values 2 to 10, Jack, Queen, King, and Ace. Before playing any game, the deck is shuffled.

The following *LogoWriter* procedures will rearrange (i.e., shuffle) the contents of a word or list. The primary procedure is called SHUFFLE. SHUFFLE requires the subprocedure BUTITEM (Crume, 1989). The code for both procedures is shown below:

```
TO SHUFFLE :MYLIST
IFELSE (COUNT :MYLIST) = 1 [OUTPUT
   FIRST :MYLIST] [MAKE "MYLIST LIST
   (RANDOM (COUNT :MYLIST)) + 1
   :MYLIST OUTPUT SENTENCE ITEM FIRST
   :MYLIST LAST :MYLIST SHUFFLE
   BUTITEM FIRST :MYLIST LAST
   :MYLIST]
END

TO BUTITEM :MYITEM :MYLIST
IFELSE :MYITEM = 1 [OUTPUT BUTFIRST
   :MYLIST] [OUTPUT SENTENCE FIRST
   :MYLIST BUTITEM :MYITEM - 1 BUT-
   FIRST :MYLIST]
END
```

Note: It is beyond the scope of this article to discuss the way in which SHUFFLE works, but those having questions should send them directly to the author. (Please include a self-addressed, stamped envelope.)

The procedure SHUFFLE requires one input—the word or list whose elements are to be shuffled. SHUFFLE reports the word or list after its elements have been randomly rearranged. For example, the command

```
PRINT SHUFFLE [A B C D E F]
```

might produce any of the following as output:

```
[F C E B A D]
[C D A B F E]
[C A F B D E]
[E A B F C D]
[C B E A F D]
```

The example above is, of course, not very useful in everyday life. A more substantial example, which shuffles an electronic deck of cards, is shown below:

```
TO DEMO
PRINT SHUFFLE DECK [] 3
END

TO DECK :DECK.OF.CARDS :FIRST.SUIT
IFELSE (COUNT :DECK.OF.CARDS) = 52
   [OUTPUT "] [OUTPUT SENTENCE
   :DECK.OF.CARDS ALL.SUITS
   :FIRST.SUIT DECK :FIRST.SUIT + 1]
END

TO ALL.SUITS :SUIT
IFELSE :SUIT > (:FIRST.SUIT + 3)
   [OUTPUT "] [OUTPUT SENTENCE
   THIS.SUIT :SUIT 1 ALL.SUITS :SUIT
```

```
    + 1]
END

TO THIS.SUIT :SUIT :N
IFELSE :N > 13 [OUTPUT "] [OUTPUT
    SENTENCE CARD :N :SUIT THIS.SUIT
    :SUIT :N + 1]
END

TO CARD :VALUE :S
IF :VALUE = 1 [OUTPUT WORD "A CHAR
    :S]
IF AND (:VALUE < 11) (:VALUE >1)
    [OUTPUT :VALUE CHAR :S]
IF :VALUE = 11 [OUTPUT WORD "J CHAR
    :S]
IF :VALUE = 12 [OUTPUT WORD "Q CHAR
    :S]
IF :VALUE = 13 [OUTPUT WORD "K CHAR
    :S]
END
```

The procedure DECK requires two inputs. The first input is an empty list that will contain the electronic deck of cards after the procedure finishes. The second input, which is the number 3, is the value whose graphic representation is the heart symbol on an IBM/PC. The graphic representations of the numbers 4, 5, and 6 are diamonds, clubs, and spades, respectively. This can be demonstrated by the command

```
(PRINT CHAR 3 CHAR 4 CHAR 5 CHAR 6)
```

which will produce

♥ ♦ ♣ ♠

The procedure DECK produces a list of electronic cards as shown below:

A♥ 2♥ 3♥ 4♥ 5♥ 6♥ 7♥ 8♥ 9♥ 10♥ J♥ Q♥ K♥

A♦ 2♦ 3♦ 4♦ 5♦ 6♦ 7♦ 8♦ 9♦ 10♦ J♦ Q♦ K♦

A♣ 2♣ 3♣ 4♣ 5♣ 6♣ 7♣ 8♣ 9♣ 10♣ J♣ Q♣ K♣

A♠ 2♠ 3♠ 4♠ 5♠ 6♠ 7♠ 8♠ 9♠ 10♠ J♠ Q♠ K♠

The author challenges users of the Apple dialect of *LogoWriter* to duplicate the display of DECK using the features of Apple *LogoWriter*.

Reference

Crume, C. E. (1989). A new primitive for *LogoWriter*. *Logo Exchange*, *8*(4), 25-26.

Charles E. Crume has over 15 years of experience in the electronics and data-processing industry. Currently, Mr. Crume is an independent computer consultant running his own company on Florida's Emerald Coast. Previous positions include senior technical consultant, software systems analyst, telecommunications analyst, and programmer. Mr. Crume has been using Logo and *LogoWriter* for several years and has taught courses in *LogoWriter* at the college level. He can be reached at

FACTOTUM Software
P. O. Box 8874
Reno, Nevada 89507