Name that Function:
Punny Function Names with Multiple MEANings and Why You Do Not Want to be MISSING Out

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ABSTRACT

The SAS® DATA step is one of the best (if not the best) data manipulators in the programming world. One of the areas that gives the DATA step its flexibility and power is the wealth of functions that are available to it. With over 450 functions in the DATA step it is difficult to learn and remember them all, however understanding how to take advantage of the power of these functions is key to taking full advantage of the DATA step.

This paper takes a PEEK at some of those functions whose names have more than one MEANing. While the subject matter is very serious, the material will be presented in a way that is guaranteed not to BOR the audience. Syntax will be discussed and examples of how these functions can be used to manipulate data will be demonstrated. With so many functions available and with less than an HOUR to present, we obviously will have to TRIM our list so that the presentation will fit within the allotted TIME.

KEYWORDS

DATA step, Functions, Routines

INTRODUCTION

There are so many functions in the DATA step, over 450, that most functions will remain unused by most SAS programmers. While this is unfortunate, it is not tragic. What is tragic is when a SAS programmer fails to take advantage of an EXISTing DATA step function through simply not knowing about it. This paper will introduce some of those functions, however it will concentrate not necessarily on those that are most useful, but rather than on some of the functions whose names might be best remembered just because of their name.

The functions have been divided into categories and each function will be introduced by asking a question. Answer it and see if you can 'Name that Function'.

TRAVEL AND LEISURE

What function might you get at the beach? (TAN, ATAN)
The TAN function measures the tangent of an angle, while ATAN returns the arctangent of an angle (the inverse of the tangent). They return the angle in radians.

```data _null_; x = tan (0); put x=; ax = atan (0); put ax=; y = tan(1); put y=; ay= atan(1); put ay=; run;```	The SAS Log would look something like this: `x =  0` `ax = 0` `y =  1.5574077247` `ay = 0.7853981634`

Example 1.

When you take a day off you are said to be on _____. (HOLIDAY)
The HOLIDAY function returns the *SAS date value* of a specified holiday for a specific year.   For example:

```data _null_; mem_day = HOLIDAY ('memorial', year(today( )))); put mem_day date9.; run;```	The SAS Log would look like this: 30MAY2016

Example 2.

Which function might remind you of Halloween? (WHICHN)
The WHICHN function searches for a numeric value that is equal to the first argument, and returns the index of the first matching value.

When on vacation what you might do late into the morning. (SLEEP)
The SLEEP function suspends the execution of a program that invokes this function for a period of time. If you put the following statement in a DATA step, it would 'freeze' the execution for 30 seconds every time the statement is executed.
```
        Freeze_action = sleep(30);
```

You can also write the SLEEP function this way…

```data _null_; sleeptime='14jan2016:03:00:00'dt - '14jan2016:02:59:30'dt; time_calc=sleep(sleeptime, 1); put 'Write something to the Log'; run;```	The SAS Log would look something like this… Write something to the Log Note: DATA statement used (total process time): real time 30:01 seconds cpu time 0.03 seconds

Example 3.

Get to know someone special. Go on a _____. (DATE)
What function is very popular on a Friday or Saturday night? (DATE)
The DATE function returns the current date as a SAS date value and is just like the TODAY function.
```
        x = date( );
```


Which function will remind you to fill your car up with gas? (ARCOS)
The ARCOS function returns the value of the arccosine of an angle. The syntax is ARCOS (*argument*) where argument is a numeric value and is expressed in radians.
```
        y = arcos(radians);
```


What function might give you a place to rest? (COT)
The COT function is in the trigonometric category and returns the cotangent.   The syntax is COT (*argument*) where argument is a numeric value and is expressed in radians.
```
        y = cot(radians);
```

The COT function is related to the TAN function in this way: COT(x) = 1/TAN(x).

What function is a <u>favorite</u> of a Golden Retriever? (FETCH)
The FETCH function reads the next non-deleted observation from a SAS data set into the Data Set Data Vector. The Data Set Data Vector is a temporary storage area for the values of the variables from one observation of a data set that was opened by the current program. The DDV is empty until an observation is read from the associated data set. A common use of the FETCH function can be found in this syntax: **do while(fetch(dsid)=0);** This translates to doing something as long as the FETCH function successfully reads an observation.

What function is a <u>least favorite</u> of a Golden Retriever? (CAT)
The CAT function returns a concatenated character string without removing leading or trailing blanks. This function can concatenate multiple strings in one function call.

```data _null_; v1 = ' A '; v2 = 'B '; v3 = ' CC '; x = cat(of v1-v3); put x=; run;```	The SAS Log would look something like this... x=A B CC

Example 4.

The CAT function makes it easier to write SAS code.   For example, x=CAT(of v1-v4) is the same as x=v1||v2||v3||v4.

Where do you pack away your extra linens? (TRUNC)
The TRUNC function truncates a numeric value to a specified number of **bytes**.   NUM=TRUNC(*number, length*) is the typical syntax, where number is the numeric value, and length is the number of bytes.

What function helps you to pack your suitcase? (COMPRESS)
The COMPRESS function returns a character string with specified characters removed (by default) from the original string.   The typical syntax is COMPRESS(*a1*, *a2*, *m*) where **a1** is the source, **a2** is the character(s), and **m** is the modifier. For example, let's say we want to remove blanks from a character string. Word=COMPRESS(name) would remove all blanks from the variable name. If the second argument is not specified, blanks are removed. If I wanted to remove all lowercase vowels from a word, I could do this, newword=COMPRESS(word, 'aeiou').   If I wanted to remove all vowels regardless of case, I could use the optional third argument 'i', which ignores the case. For example:

```data compress; input name $ 1-18; No_Vowels = compress(name, 'aeiou', 'i'); datalines; Arm and Hammer Arts and Crafts Aerospace Engineer run;```	The PROC PRINT Output looks like this: Obs name No_Vowels 1 Arm and Hammer rm nd Hmmr 2 Arts and Crafts rts nd Crfts 3 Aerospace Engineer rspc ngnr

Example 5.

What did the fisherman lie about? (LENGTH)
The LENGTH function returns the length of the VALUE of a character variable.
        x = length(character_string);

What function helps to lower the level of light? (DIM)
The DIM function returns the number of elements in an array. It can be used with arrays of one dimension or multiple dimensions.

```
do i = 1 to dim(array_name);
```

The above loop will execute once for every element in the array.

That movie was terrible; it was such a _____. (BOR)
The BOR function returns the bitwise logical OR of two arguments.

What function reminds us of the play "Arsenic and Old Lace"? (POISSON)
The POISSON function returns the probability that an observation from a Poisson distribution, with mean *m*, is less than or equal to *n*. To compute the probability that an observation is equal to a given value n, compute the difference of two probabilities from the Poisson distribution for *n* and *n-1*. That is, it predicts the **degree of spread** around a known average rate of occurrence. If the results are plotted and shown as a curve, the average or likeliest actual occurrence is the hump on the curves.

WALKING AND HIKING
When hiking in the woods you should remember this function. (PATHNAME)
The PATHNAME function returns the physical name of an external file or a SAS library, or returns a blank.
For example, you could use the PATHNAME function this way:

```
x=pathname('sasuser');
```

You will see the physical location of the SASUSER library.

What function tends to fall behind on a walk? (LAG)
The LAG function returns values from a queue. The contents of the queue are previously processed observation(s).
For example, if you put this statement in DATA step:

```
previous_name=lag(name);
```

This would return the value of the variable NAME from the previously processed observation.

What function reminds us of a fallen tree? (LOG)
The LOG function returns the natural (base e) logarithm.

PERSONAL HEALTH AND RELATIONSHIPS
What function is a goal of a good psychologist? (NORMAL)
The NORMAL function returns a random variate from a normal distribution.

What function does the psychologist guard against? (DEVIANCE)
The DEVIANCE function returns the deviance based on a probability distribution.

One goal of couple's therapy is to do this to marital issues. (RESOLVE)
The RESOLVE function returns the resolved value of the argument after the argument has been processed by the macro facility.

The husband was _____ and it made the wife _____. (MEAN**,** MAD)
The MEAN function calculates the mean (arithmetic average) from its arguments. For example:

```
Average=mean(of Test1-Test7);
```
The MAD function returns the median absolute deviation from the median.

After the divorce the ex-wife did this. (RENAMEd)
The RENAME function renames a member of a SAS library, an entry in a SAS catalog, an external file, or a directory.
For instance, the following examples rename a SAS data set from Data1 to Data2, and also rename a catalog entry from A.SCL to B.SCL.

```
rc1=rename('mylib.data1', 'data2');
rc2=rename('mylib.mycat.a.scl', 'b', 'catalog');
```

SAS returns a 0 if the operation was successful and a value other than 0 if the operation was not successful. Warning: use the RENAME function in a directory based system only. If you do this in a mainframe SAS session, you will get an error.

 What your mother always said: " _____ I said so". (COS)
The COS function is a trigonometric function that returns the cosine.   Some examples include:

```
a = cos(.0.5) ;    this returns  →   0.87756.
b = cos(0);        this returns  →   0.
```

An example of the COS function can be found in Example 8.

As President Reagan famously said; "Trust but _____". (VERIFY)
The VERIFY function returns the position of the first character in a string that is not in any of several other strings.
The following DATA step illustrates how the VERIFY function works.

```data _null_;```
```   input Age : $2. @@;```
```   valid_ages='14 15 16';```
```   if verify(age, valid_ages) > 0```
```   then put @1 'INVALID ' age=;```
```   datalines;```
```12 13 14 15 16```
```;```
	The SAS Log would look something like this…
	
	```INVALID age=12```
	```INVALID age=13```

Example 6.

PERSONAL HYGIENE AND HEALTH
What function will help you to straighten your hair? (COMB)
The COMB function computes the number of combinations of *n* elements taken *r* at a time: where *n* is a nonnegative integer that represent the total number of elements from which the sample is chosen, and r is a nonnegative integer that represents the number of chosen elements. R needs to be less than or equal to N. The syntax is: x=comb(n, r);
So the statement, ```x=comb(4, 2);```, would result in ```x= 6;```

Be sure to shave daily to remove the _____. (FUZZ)
The FUZZ function returns the nearest integer if the argument is within 1E-12 of that integer.

What function would a sailor do to the sails in his or her boat? (HOIST or TRIM?)
Since there is no Hoist function, the correct answer would be the TRIM function.   The TRIM function trims all trailing blanks from a character string. For example, if x='abc ', then b=trim(x)!!'*'; would return 'abc*';

You may not need a haircut, but at least get a _____. (TRIM)
Did we trick you by using this function twice in a row?

The lady went to the hairdresser to get her _____. (PERM)
The PERM function computes the number of permutations of *n* items that are taken *r* at a time. The syntax is:
X=perm(n, r); For example, x=perm(4, 1) would return a 4, and x= perm(4, 2) would return a 12.

What function is overcome by body building? (WEEK)
The WEEK function reads a SAS date value and returns the number of elapsed weeks within the calendar year of the SAS date value. Since weeks and years do not share common boundaries (a year can start in the middle of a week), a user can use a second argument to the WEEK function to 'tweak' the way the function works. For example:

| data _null_;
  td='03jan2016'd;
  w1 = week(td, 'u'); put w1=;
  w2 = week(td, 'v'); put w2=;
  w3 = week(td, 'w'); put w3=;
  w4 = week(td) ;   put w4=;
run; | The SAS Log would look something like this…

  w1 = 1
  w2 = 53
  w3 = 0
  w4 = 1 |

Example 7.

What function is built up by body building? (ABS)
The ABS function returns the absolute (nonnegative) value that is equal in magnitude to the argument.   For example, X=abs(-5), returns a 5.

After working out at the gym regularly, what do people say about you? (SUMABS)
The SUMABS function returns the sum of the non-missing absolute values of the argument.   For example, X=sumabs(-5,5,.,4), returns a 14.

If you do not bathe regularly, what function might you smell like? (RANK)
The RANK function returns the position of a character in the ASCII or EBCDIC collating sequence.

LAS VEGAS

Las Vegas used to be known as what city? (SIN city)

The SIN function returns the SINE, which, in mathematics, is a trigonometric function of an angle. The SIN function is used to calculate the SINE of an angle measured in radians. The general syntax is:

```
y = sin(radians);
```

You can use the SIN function along with the COS function to help draw a circle with the DATA step.

<pre>data _null_;
radius = 15;
file print n=ps;
do angle = 0 to 2*3.1416 by .02;
x=radius * cos(angle) + 37;
y=26-radius * sin(angle) * .6 -5;
put #y @x '*';
end;
run;</pre>	The output window will look like this:<pre> ***********
***   ***
**   **
**   **
*   *
*   *
*   **
**   **
**   **
***   ***
***********</pre>

Example 8.

Will mastering the SIN and the COS functions help you be in high demand as a SAS programmer? Probably not.   Will mastering the SIN and COS functions help you pass a SAS certification exam? Probably not.   But, mastering these functions will make you a "well rounded" SAS programmer who can program circles around your colleagues (at least in the LISTING destination).

What is a function that you do not want to catch in Las Vegas (or anywhere)? (STD)

Use the STD function to calculate the standard deviation of a list of values.

```
sd = std(of value1-value25);
```

What type of show should you avoid? (PEEK)

Different than a peep show, the PEEK function stores the contents of a memory address into a numeric variable.

```
Y = peek(x);
```

All the big casinos are on the _____.   (STRIP)

Another type of show to avoid. The STRIP function removes leading and trailing blanks.

```
short = strip(longervariable);
```

FOOD

Where do milk cows call home? (DAIRY)
Returns the derivative of the AIRY function. Which reminds us of the valley girl who was such an AIRY head.

Where do beef cattle call home? (RANGE)
Returns the difference between the largest and smallest arguments.
```
x = range(1,2,3,4,5);  returns a 4.
```

Eat your food one of these at a time. (BYTE)
Returns the ASCII or EBCDIC code given a decimal value.
```
B=byte(decimalvalue);
```

What function helps us put the plates on the dinner table? (SET)
The CALL SET routine links data set and macro variables and allows the user to create a large number of macro variables based on the values in a data set.

WORLDLY

What function is the favorite of the Russian president? (PUTN)
Similar to the PUT function, but PUTN allows you to specify a numeric format at execution time.
```
cvar = putn(nvar, fmtvar);
```

What function reminds us of Hillary Clinton? (SECretary of State)
The SEC function returns the secant of an angle measured in radians. The secant is the inverse of the cosine.

Use this function to communicate in another language. (TRANSLATE)
The TRANSLATE function converts characters values within a character string.
```
new = translate(old, '/', '\');
```

What functions help us deal with contracts? (You can **CLOSE** negotiations and **CIEL** the deal.)
The CLOSE function closes a SAS data set and the CEIL function truncates a numeric value to the next larger integer.

Those who do not study history are doomed to _____ it. (REPEAT)
Generates a string of repeated characters.
```
R = repeat('-',24);    will generate a string with 25 dashes.
```

MILITARY

The marine wore this function with pride. (UNIFORM)
Returns a random variate from a uniform distribution. Same as the RANUNI function.
```
    rand = uniform(0);
```

The colonel had more of this than the lieutenant. (RANK)
Not the same as a bad odor, this function returns the collating sequence ranking. Lower numbers sort first.
```
    rank_A = rank('A');
```

This was John Philip Sousa's favorite function. (BAND)
The BAND function returns the bitwise logical AND of two arguments.
```
    x=band(0Fx, 05x);
```

The ancient Romans used this military tactic, "_____ and conquer". (DIVIDE)
Perform division by using the DIVIDE function, which protects the user from division by zero.
```
    div = divide(7/x);
```

MISCELLANEOUS

What function should you not fear? (DREAD)
Read the names of members within a directory using the D-READ function.
```
    lstname = dread(d_id, n);
```

Not the same as the Dread Pirate Roberts, nor is it used by hairdressers when creating dread-locks.

What function contains no fiction? (FACT)
Calculate the factorial of a number using the FACT function.
```
    f = fact(15);
```

What function helps us recover lost objects? (FIND)
Similar to INDEX, the FIND function allows you to search for characters within a text string.
```
    col = find(bigstring,smallstring);
```

What function helps you to lay down new carpet? (FLOOR)
You can truncate a number down to the next lowest integer using the FLOOR function.
```
    flr = floor(1.2);
```

What function reminds you of Dracula? (COUNT)
This function COUNTs the number of times a text sub-string appears within a text string.
```
    n = count(bigstring, 'i');
```

What function helps you sell stocks and bonds?   (SEC)
 The SEC function returns the secant of an angle, which is the inverse of the cosine (COS).

Did you know that criminals cannot sink _____? (ANYLOWER)
The ANYLOWER function returns the position of the first lower case letter.

What function helps you start a fire?   (ARSIN)
The ARSIN function returns the arcsine of an angle, which is the inverse of the sine (SIN).

When purchasing an item, never buy a pig in a _____. (POKE)
The CALL POKE routine writes a value directly to memory.

What function do you use when you want to destroy something?   (DCREATE)
The DCREATE function creates directories.

Which function determines the gold medal winner? (FIRST)
The FIRST function returns the first character in a string.

```
start = first(textstring);
```

Of course the silver medal is determined by the **SECOND** function, and the **NOTFIRST** function is a disappointment.

What function is the last one in this paper? (LAST)
Another trick question - unfortunately the LAST function does not exist. To return the last character in a string use a combination of the FIRST and REVERSE functions

```
end = first(reverse(textstring));
```


SUMMARY
We cannot stress enough how very important it is for you to "know the functions". It has not been unusual in our consulting for a client to proudly show us code that they have developed, tested, and agonized over, that could have been replaced with a simple function call – if they had known their functions. Many of these functions you will never need to use, but make that a choice based on knowledge, not because you "never heard of that one".

ABOUT THE AUTHORS
Ben Cochran has been a SAS user since 1984. After more than 11 years with SAS Institute in the Professional Services (as an Instructor) and Marketing Departments (as Marketing Manager for the SAS/EIS product), Ben Cochran left to start his own consulting and SAS Training business, The Bedford Group, in the fall of 1996

As an affiliate member of SAS Institute's Alliance Partner Program, Ben has been involved in many consulting projects over the last 20 years and has been teaching SAS courses since 1985. Included in his curriculum of over a dozen courses, Ben teaches courses that prepare students for SAS Certification.

Ben is a Certified SAS programmer and has authored and presented dozens of papers at SUGI/SASGF, PharmaSug, state and regional user groups on a variety of topics since 1988.

Art Carpenter's publications list includes; five books, two chapters in *Reporting from the Field*, and numerous papers and posters presented at SAS Global Forum, SUGI, PharmaSUG, WUSS, and other regional conferences. Art has been using SAS since 1977 and has served in various leadership positions in local, regional, and national user groups.

Art is a SAS Certified Advanced Professional Programmer, and through California Occidental Consultants he teaches SAS courses and provides contract SAS programming support nationwide.

His recent publications are listed on his sasCommunity.org Presentation Index page.
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