

## Computer Karma: Non-Monetary Benefits from Statistical And Information Technology Volunteer Work

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### ABSTRACT

Volunteer statistical and information technology work offers many rewards other than direct monetary payment. Many of these rewards are at least as valuable as money.

First, the volunteer can enhance one's skills, which will be useful in a present or future job. Examples with SAS range from simple techniques, such as computing intraclass correlation coefficients with Proc Mixed to complex analysis methods, such as learning how to bootstrap indirect effects with Proc CALIS. Other non-SAS examples are learning how to debug error messages about audio links in web pages and expanding knowledge of computer trouble shooting.

In order to be successful as a data scientist, analysts must be continually willing to expand their skills through continuing education. Volunteer work enhances and supplements formal classes and workshops, by providing learning opportunities without the rigid deadlines in a paid job.

Second, the volunteer can network with people who may later assist in finding a job. Real life examples will be provided of people who found data analysis and information technology jobs, by being involved in volunteer projects.

Third, the volunteer may connect with people who can assist with over-employment by serving as referrals for unwanted overtime projects. Again, real life stories will be illustrated.

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### 1)\_ Introduction.

My job involves many aspects of data management and data analysis from health studies. I set up websites, access databases, and online Qualtrics interviews to collect data. After the data has been collected, SAS is usually the statistical analysis package. In order to be a successful data scientist, one must be aggressive in seeking out new knowledge and always searching for ways to expand one's skills.

When the local SAS users group or the American Statistical Association (ASA) have meetings, classes, or webinars, I always attend if I'm available, even if I have to pay out of pocket. Volunteer projects are not a replacement for paid educational training. Volunteer work supplements paid training by providing an opportunity to apply what has been learned without the pressure of a deadline in a paid job.

### 2)\_ Definition of Naturalistic Karma.

My favorite definition of karma is "the natural consequences of one's actions". Some of our actions towards other people, other beings, and the planet return to us. For example, those who open doors for

others will have doors opened for them. Those who send greeting cards will receive them. As people in 12 step groups say, "What goes around comes around". When a rubber ball is thrown against a wall, it rebounds.

Of course, not all of our actions return to us. Terrible things happen to both good and bad people. So, only part of what happens to us can be explained by our own actions (karma). The reasons for terrible things happening and good deeds not always being rewarded are in the realms of faith and philosophy, far beyond the scope of this paper. My focus will be solely on non-monetary benefits from statistical and information technology volunteer work, jokingly called "Computer Karma". Based on my experience, "Computer Karma" from volunteer work is a treasure - with benefits that are at least as good as money.

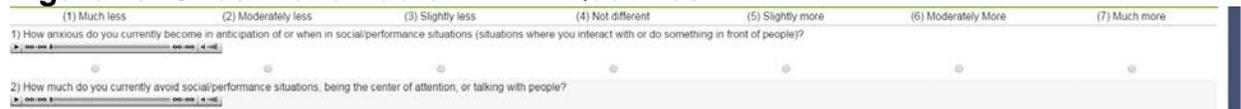
### 3)\_ Knowledge and Experience.

My first Eureka moment, when I realized that computer volunteer work benefitted my personal agenda, was while working as a volunteer for the database committee at my congregation. Initially, I did not expect any benefits other than helping the congregation to save money by using volunteers, instead of hiring people, and that I would expand my circle of friends. One day, one of the volunteers, Jim, opened Windows Explorer by right clicking on Start /Explore. I had always clicked on Start and then selected Explore from the Start menu. Although I never expected this to be useful on a job, several years later, I was sent to a community health center in Southwest Detroit to install an Access database that I had created for a health study. When I clicked on Start to get to Windows Explorer, "Explore" was not on the drop-down list. Then, I remembered that trick that I had learned on the database committee, right clicked Explore, and this saved me from an embarrassing call to tech support.

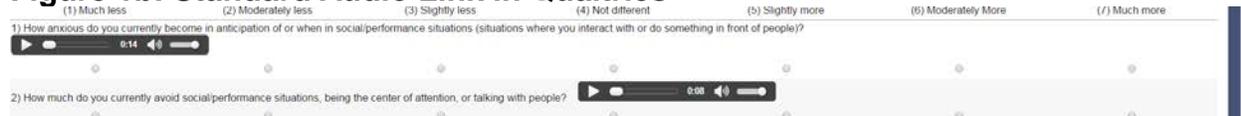
Second, computer volunteer work helped me to find a solution to one of the scariest error messages I have ever seen. As a website volunteer at my congregation, I uploaded audio files and created <audio> html tags. Because deafness was an exclusion criteria for most of my studies at work, I did not expect any benefit at work and thought I was just doing a good deed – making sermons available to people with hearing impairment or people who could not attend in person.

At work, I was asked to find a way to have Qualtrics interview questions read out loud, because some people in a study for people with social anxiety disorder had literacy problems. We decided that the best method would be for someone to read the text of the various interview questions and then install audio links. In Qualtrics, the default audio link was a shockwave link, obtained by clicking on the icon to add an audio link. Pictures of Shockwave and standard audio links are displayed in figures 1a and 1b.

**Figure 1a: Shockwave Audio Link in Qualtrics**



**Figure 1b: Standard Audio Link in Qualtrics**



One day, I was suddenly interrupted from lunch hour with an emergency tech support call. My Qualtrics interviews had been terminating with the error message, "**Shockwave has crashed**". At the time, I had never heard of Shockwave and thought I was just inserting ordinary audio links. So, I called Qualtrics tech support and the support person was stumped. Like SAS, Qualtrics has outstanding technical support. When I encounter a bizarre error that stumps the tech support staff at SAS or Qualtrics, that's when I feel like I'm in the error message twilight zone.

Then, I did some research on audio links and found out that Shockwave links were being phased out AND I noticed that the Shockwave links looked different than the audio links on my congregation's web pages. So, I hacked into the html code for the Qualtrics interviews and changed the Shockwave audio links to standard audio links, and the system worked fine. Last, I informed Qualtrics tech support of how I fixed the problem. In SAS, the default options are not always the best. That is also true in other software. Thanks to my volunteer work, I was able to fix the audio link problem at my job. That was computer karma at its best!

My other area of volunteer work is when study grants end at work and I continue as a volunteer to finish analysis projects for publications. Of course, I would prefer to get paid, but that's not always possible. One of my projects involved structural equation model (SEM) analysis of the effects on non-discrimination policies and resources on hostility and microaggressions towards lesbian, gay, bisexual, and transgender (LGBT) college students. After the grant timed out, I continued to work on the analysis as a volunteer.

Before setting up a structural equation model, I checked for clustering at the state level. As a volunteer, I learned how to use Procs Mixed and IML to check for the level of intra-class correlation (ICC) at the state level. Then, I used a likelihood ratio test to check whether the clustering by state was significant.

Let  $\sigma_b^2$  = Variance due to students within the same state.

Let  $\sigma_e^2$  = Error Variance.

$ICC = \sigma_b^2 / (\sigma_b^2 + \sigma_e^2)$  = Correlation coefficient from effect of students in the same state.

Through this project, I learned about how to compute the ICC in SAS, along with how to do a likelihood ratio test for significant clustering effect, which is shown below.

```
/* Random Intercept for State (AKA Clustering at the state level) */
ods graphics on;
Proc Mixed Data=StateEnviro Method=REML NOCLPRINT;
Class college_location;
Model LGBQ_Hostility =Race_White_POC Age_Recode StudentStanding_UGrad_YN
Cisgender_atypical_expression4 gender2
POLICY_gi Domestic_partner_benefits LGBT_Office2 Ally_programs LGBTQ_courses
Alumni Name_choice StudentOrgRatio/solution;

Random int/subject = state;
Run;
ods graphics off;

/* Model without Random Intercept for State */
Same as above, but omit Random int/subject = state;

/* Likelihood Ratio Test for Clustering by State */
Proc IML;
LRT_Full=500.2;
LRT_Reduced=500.9;
LRT=abs(LRT_Full-LRT_Reduced);
p_value=.5*(1-probchi(LRT,1)); /* p=0.2014 */
print LRT[format=7.2] p_value[format=7.4];
quit;
```

For most of the outcomes, the ICC was so small that Proc Mixed gave me the error message, "Estimated G matrix not positive definite", which usually means that the random effect can be removed from the model. For the outcomes for which the ICC was estimable, the value was very small (<.1) and the likelihood ratio test indicated that the clustering by state variance (random effect) was non-significant.

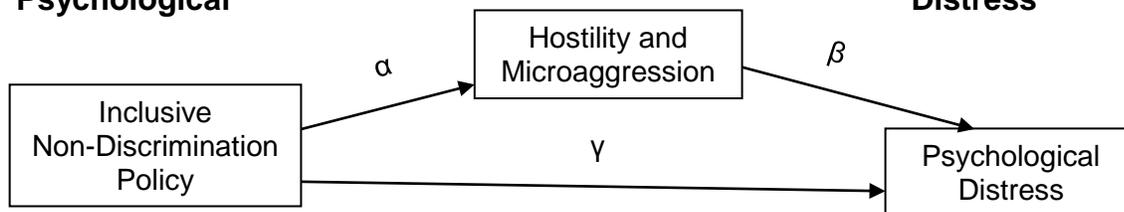
For more information on testing random effects in linear mixed models, please see references<sup>1,2</sup> 1(West, Welch, Galecki) and 2(SAS Institute).

A few months later, I was invited to be an analyst on a totally unrelated, paid project on using virtual reality interviews to help autistic high school students handle job interviews. The project leader asked me if I had any experience in computing and testing intra-class correlation coefficients. I showed him my SAS code, publication, and response to the reviewers, and I got the job. Again, computer karma helped me to stay employed.

Fourth, a reviewer for the requested that we report indirect effects from the SEM analysis with bootstrapping. Indirect effects mean that a variable, X, has a significant effect on outcome, Z, through variable Y. For example, see figure 2 below.

- Let  $\gamma$  = direct effect of inclusive non-discrimination policy on psychological distress.
- Let  $\alpha$  = direct effect of inclusive non-discrimination policy on hostility and microaggression.
- Let  $\beta$  = direct effect of hostility and microaggression on psychological distress.
- Then, the indirect effect of an inclusive non-discrimination on psychological distress =  $\alpha\beta$ .
- Total effect of inclusive non-discrimination policy on psychological distress = direct + indirect =  $\gamma + \alpha\beta$ .

**Figure 2: Direct and Indirect Effects of Non-Discrimination Policies on Psychological Distress**



SAS Proc CALIS does not currently have the capability to report bootstrapped confidence intervals. So, I learned how to program bootstrapped confidence intervals. Bootstrapping refers to estimating a parameter and confidence interval for the parameter by taking a large number of samples with replacement. I expect that this experience will be an asset in a future job. This experience has already helped me when I was unexpectedly asked to help with the statistical analysis section of a grant from an unrelated study on prisoner recidivism, and grant contained a section on mediation analysis with bootstrapping.

```

*** Bootstrap Begin ***;
*** First, take 10,000 random samples with replacement ***;
PROC SURVEYSELECT data=Brandy.StateEnviro_ForSAS Seed=12212017 method=urs
n=268 reps=10000 out=bootsamp10000 outhits; run;

*** Run SAS modeling procedure by Replicate ***;
proc calis data=BootSamp10000 method=fiml;
  path
    /* Factor equations */
    F_Discrim ---> LGBQ_Hostility = P_Hostility_Discrim,
    F_Discrim ---> LGBQ_Interpersonal_Micro = P_Interpers_Discrim,
    F_Discrim ---> LGBQ_Enviro = P_Enviro_Discrim,

    F_SelfAccept ---> Self_Esteem_New = P_SelfEsteem_SelfAccept,
    F_SelfAccept ---> Internal_LGBQ_Pride = P_Pride_SelfAccept,

    F_Distress ---> Anxiety = P_Anxiety_Distress,
  
```

```

F_Distress ---> Stress = P_Stress_Distress,

F_Discrim ---> F_SelfAccept F_Distress = P_Discrim_SelfAccept
P_Discrim_Distress,

Race_White_POC Age_Recode StudentStanding_UGrad_YN
Cisgender_atypical_expression4 gender2
POLICY_gi Domestic_partner_benefits LGBT_Office2 Ally_programs LGBTQ_courses
Alumni Name_choice StudentOrgRatio ---> F_Discrim =
P_Discrim_Race P_Discrim_Age P_Discrim_GradUGrad P_Discrim_GenderExp
P_Discrim_Gender
P_Discrim_POLICY_gi P_Discrim_DomPartBen P_Discrim_LGBT_Office2
P_Discrim_Ally_programs P_Discrim_LGBTQ_courses
P_Discrim_Alumni P_Discrim_Name_choice P_Discrim_StudentOrgRatio
;

pvar
F_Discrim=1, F_SelfAccept=1, F_Distress=1;

pcov
F_SelfAccept F_Distress;

var Race_White_POC Age_Recode StudentStanding_UGrad_YN
Cisgender_atypical_expression4 gender2 gender_exp_interact
LGBQ_Hostility LGBQ_Interpersonal_Micro LGBQ_Enviro
Self_Esteem_New Internal_LGBQ_Pride Anxiety Stress
POLICY_gi Domestic_partner_benefits LGBT_Office2 Ally_programs
LGBTQ_courses Alumni Name_choice StudentOrgRatio
;

*** Compute indirect effects as product of path coefficients ***;
testfunc H1_CourseOnDistress H2_CourseOnSelfAcc H3_PolicyOnDistress
H4_PolicyOnSelfAcc H5_OrgRatOnDistress H6_OrgOnSelfAcc;
H1_CourseOnDistress = P_Discrim_LGBTQ_courses*P_Discrim_Distress;
H2_CourseOnSelfAcc = P_Discrim_LGBTQ_courses* P_Discrim_SelfAccept;
H3_PolicyOnDistress = P_Discrim_POLICY_gi*P_Discrim_Distress;
H4_PolicyOnSelfAcc = P_Discrim_POLICY_gi* P_Discrim_SelfAccept;
H5_OrgRatOnDistress = P_Discrim_StudentOrgRatio*P_Discrim_Distress;
H6_OrgOnSelfAcc = P_Discrim_StudentOrgRatio* P_Discrim_SelfAccept;
*Where Replicate>=1 and Replicate<=10;
By Replicate;
ODS Output ParmFunc=ParmFunc1to10000;
run;

*** Save 10,000 Bootstrapped Estimates ***;
Data Brandy.ParmFunc1to10000;
Set ParmFunc1to10000;
RowNum=_N_;
Run;

*** Set Index = Row Number for Faster Processing ***;
Data Brandy.ParmFunc1to10000(index=(RowNum));
Set Brandy.ParmFunc1to10000;
Run;

*** Output Parameters to Separate Datasets ***;

```

```

Data H1_CourseOnDistress H2_CourseOnSelfAcc H3_PolicyOnDistress
H4_PolicyOnSelfAcc H5_OrgRatOnDistress H6_OrgOnSelfAcc;
Set Brandy.ParmFunc1to10000;
if ParmFunc='H1_CourseOnDistress' then output H1_CourseOnDistress;
if ParmFunc='H2_CourseOnSelfAcc' then output H2_CourseOnSelfAcc;
if ParmFunc='H3_PolicyOnDistress' then output H3_PolicyOnDistress ;
if ParmFunc='H4_PolicyOnSelfAcc' then output H4_PolicyOnSelfAcc;
if ParmFunc='H5_OrgRatOnDistress' then output H5_OrgRatOnDistress ;
if ParmFunc='H6_OrgOnSelfAcc' then output H6_OrgOnSelfAcc;
Run;

/* Histograms, Descriptive Statistics, P2.5, P97.5 for Each Parameter
Function */
ods html path="c:\temp"; ods graphics on;
Title "
Proc Univariate Data=H1_CourseOnDistress;
  Var Estimate;
  Symbol1 V=Dot;
  Histogram / Normal(Mu=Est Sigma=Est Color=Red) CFILL=Blue;
  QQPlot / Normal(Mu=Est Sigma=Est L=1);
  output out=Pctls pctlpts = 2.5 50 97.5
         pctlpre = PolicyOnDistress
         pctlname = pctlL median pctlU;

/* 2.5th to 97.5th percentiles = 95% confidence interval */
proc print data=pctls;
run;
ods graphics off; ods html close;

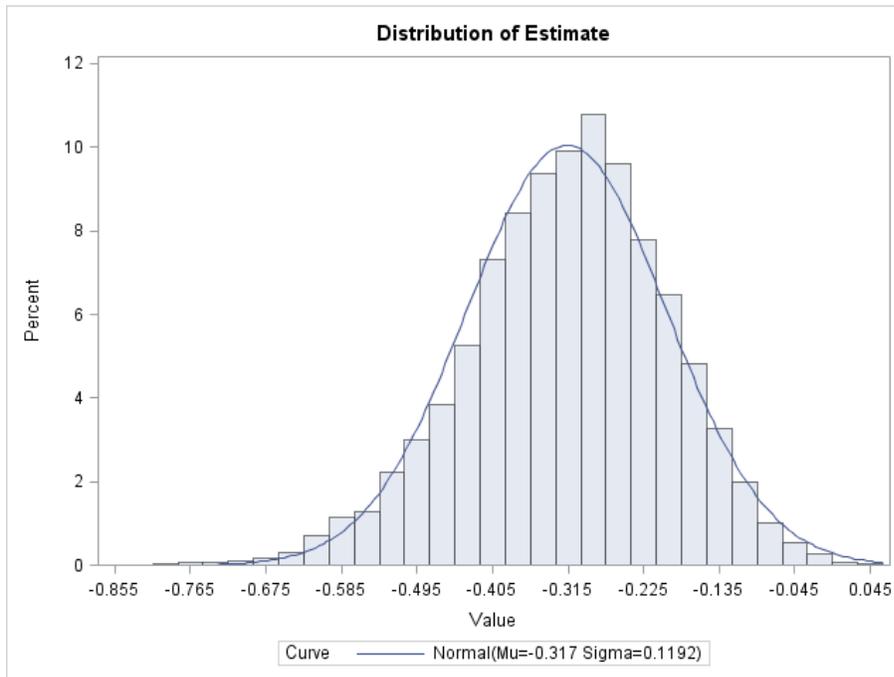
/* Macro to Display Graph of Bootstrap Distribution of Paramter */
%Macro UniGraph(DatSet);
ods html path="c:\temp"; ods graphics on;
Title "Ind Eff: &DatSet";
Proc Univariate Data=&DatSet;
  Var Estimate;
  Symbol1 V=Dot;
  Histogram / Normal(Mu=Est Sigma=Est Color=Red) CFILL=Blue;
  QQPlot / Normal(Mu=Est Sigma=Est L=1);
  output out=Pctls pctlpts = 2.5 50 97.5
         pctlpre = &DatSet
         pctlname = pctlL median pctlU;
Run;

proc print data=pctls;
run;
ods graphics off; ods html close;
%Mend UniGraph;

%UniGraph(H1_CourseOnDistress);
%UniGraph(H2_CourseOnSelfAcc);
%UniGraph(H3_PolicyOnDistress);
%UniGraph(H4_PolicyOnSelfAcc);
%UniGraph(H5_OrgRatOnDistress);
%UniGraph(H6_OrgOnSelfAcc);
*** Bootstrap End ***;

```

**Figure 3: Histogram of Bootstrapped Parameter Estimates**



For more details, please see my MWSUG Data for Good 2017 paper<sup>3</sup>.

Training classes and seminars range in cost from under \$100 to over \$1000. In my opinion, any volunteer work that expands knowledge and skills for a job has monetary benefit. Further, I think reviewing abstracts for conferences has monetary benefit because the reviewers expand their knowledge about their field of work. For example, while reviewing papers for the Advanced Analytics track at MWSUG, I learned about collinearity diagnostics, fitting non-traditional models with Proc NLMixed and other helpful skills for a job.

To me, knowledge means more than information from reading books and attending presentations. Another important resource for knowledge is having a network of peers, with whom to ask questions and share information. By volunteering for the Michigan SAS Users Group, the American Statistical Association (ASA), and my congregation's website volunteer group, I have a network of people for mutual tech support. Several times a year, I ask questions to my volunteer buddies and I also respond to questions that are sent my way. It's a mutually assured survival relationship. For example, I could not find the SPSS equivalent of the SAS statement "if X in (1, 5, 7) then do ...;". So, I posted my question to my Michigan SAS network and Barry responded that SPSS "ANY" was equivalent to SAS "IN". Nancy, also in MISUG, responded to my e-mail messages about Proc Compare.

Last, people with statistics degrees sometimes end up in jobs, in which they do mostly database programming or other programmer work, but don't use much high-level statistics. Volunteer projects offer a way to keep one's statistical skills polished and expand one's skills. If the volunteer work leads to a conference presentation or a journal article, it can help a person find paid work as a statistician.

#### **4)\_Networking, Employment Opportunities.**

Occasionally, I mentor students. When they ask me about the best way to find a good job, my answer is always "network to the maximum extent possible". Find out where friends and colleagues, who one

meets in volunteer groups and professional societies work, and what their workplace cultures are like. This is the best way of finding a workplace where one will fit in well.

Next, here are a couple stories of people who started out as volunteers and their volunteering led to paid jobs. Hope had a liberal arts degree and volunteered for group helping to connect local schools to the Internet. One of the other volunteers in this group was a father who worked at University of Michigan (UM) in the Medical Center Information Technology group. When a job opening became available, he informed Hope and she is now an information technology professional.

Connie volunteered for the website group at my congregation. At that time, I was working full-time at the UM School of Public Health. When a colleague offered me a second job to work on a website for another project, I respectfully declined and referred Connie, who was thrilled to get this job. In my case, this second job could have led to burn-out and interfered with my main job. Thanks to computer karma, I was able to prevent my own burnout and Connie got her foot in the door for professional website work.

By attending meetings for the SAS user group, American Statistical Association, and American Society for Quality, I have seen people get interviews with the real Ford Motor Company and the real Warner Lambert, rather than contract/temporary positions. Last, I credit computer karma with my current job at the University of Michigan. I had never considered the university as a possible employer and had thought that local companies were my only option. When I was unemployed, a colleague from my volunteer network suggested that I apply for a job at the University of Michigan Temporary Staffing Services. Nine months later, I was converted to a regular employee with benefits. Every year, I celebrate my anniversary of being converted to a regular employee as one of the happiest days of my life!

## 5) Over-Employment.

Like nutrition, protein and vitamin C, employment is essential for survival. Employment provides an opportunity to do good for our society, and (hopefully) ensures that we will have enough money to live in a humble home and drive a humble car. Just as too much protein or vitamin C can become toxic, so can an excessive level of employment that is far beyond what is needed to pay for a humble home and humble car.

To me, over-employment means being pulled into extra jobs that are not part of my main 100% appointment. These jobs are often presented as “small” projects for weekends or evenings to make some extra money. I have seen several cases of people who were once considered good employees, but over-employment led to them being fired from their main jobs. The over-employment destroyed their main jobs through burnout and lower quality of work or from “conflict of interest” violations. “Conflict of Interest” became an issue because what the job offerers claimed were small jobs, turned out to interfere with work that was supposed to be done during normal business hours.

I try to avoid over-employment because it prevents me from giving everything I have to give to my main job, where 8 – 5 is sometimes not adequate. Coming in before 8 or staying after 5 is not unusual for me. If I am asked to work overtime for my main job to help with a publication, presentation, statistical or software issue, I always say yes, although I would rather have a life outside of work than any amount of money. Getting involved with extra projects would stand in the way of me putting extra effort into my main job.

However, I am careful not to offend person offering the extra job. Even if I don't need the job right now, my projects and grants change every few years. So, a year or more in the future, a job offer from this person could be a life saver! I sometimes offer to accept if this new job can be temporarily worked in as part of my main 100% appointment and that has occasionally happened. Or, I thank the person for their kind offer and ask if they will accept a referral to someone with excellent qualifications who doesn't already have a job that meets their needs.

Here's where karma comes into the picture. Because of the natural consequences of my actions, of my karma, I am connected to a large network of people who do similar work to mine through the SAS user group, the ASA, and my congregation's web volunteer group. Some of the people who come to those

meetings are between jobs, semi-retired, or who want a second job for weekends or evenings. To them, a temporary part-time job would be welcome as a life saver or as supplementary retirement income. Even when I'm not dealing with over-employment, I solicit resumes so that I am prepared with referrals when I am faced with over-employment.

Next, I would like to share some real life stories of computer karma helping me with over-employment. First, one day I was on my way out of the building after coming in before 8 and leaving after 5. A professor approached me and asked if I wanted an extra little job doing statistical analysis to make some extra money. I responded that while I appreciated her kind offer, I already had a full-time job that kept me busy from before 8 to after 5. Then, I asked if she would consider a referral to someone with excellent qualifications, who didn't already have a job.

The next morning, I thought of Anamaria, who I had met at ASA and SAS meetings, and works part-time as a statistical consultant, focusing her main energy on Proc GrandMother. Anamaria responded to my e-mail and welcomed the employment opportunity. Within less than 24 hours, my over-employment problem was solved and Anamaria was happy with this part-time job.

Second, a colleague approached me and offered me an evening job teaching an Access database course. When I asked how this evening job would effect my main day job, the person didn't have a clear answer. While I like my job, I don't want to be in a position where I can't do anything else. So, I responded, "Let me think about this. It might work out better if we can find someone who doesn't already have a job that meets their needs. Please keep me in mind for the future." Then, I sent an e-mail to my congregation's web volunteer group about needing to find someone to teach an evening Access database course. Someone responded with a referral to a friend who had taught Microsoft training courses, but was currently between jobs. This person jumped at the opportunity and my problem was solved.

Third, when Connie (mentioned earlier) took the part-time web job in my department, this was another win-win situation resulting from computer karma. Connie got the part-time job that she wanted and needed, while I didn't have to risk the extra job interfering with my main job.

Finally, if I didn't have easy access to referrals for over-employment, I would either have to risk endangering my main job or hire a recruiting service to find people to fill these positions. Therefore, I think that help with over-employment is equivalent to a monetary benefit.

## 6)\_Conclusions.

While there is no guarantee of computer karma from statistical and information technology volunteer work, I have experienced benefits that are least as good as getting paid with money. First, I have gained valuable knowledge and experience with being constrained by the deadlines in a paid job. Second, I have found a professional network for sharing information and asking questions. Third, the volunteer often learns about employment opportunities and networks with people who have job openings. Fourth, through networking, a volunteer can develop a list of referrals for over-employment.

Finally, considering the non-monetary benefits from statistical and information technology volunteer work, aka computer karma, I recommend this as part of "employment self-defense" – to maximize the probably of continuing to be employed. The knowledge, experience, networking, and assistance with over-employment have monetary value, even though there is no income to report to the IRS. A modest amount of time on volunteer projects can help to ensure continued employment. I plan to continue volunteering and expect to paid richly in units of computer karma.

## REFERENCES

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<http://www.mwsug.org/proceedings/2017/DG/MWSUG-2017-DG01.pdf>

## CONTACT INFORMATION

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