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A break to moderate drinkers

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Grim (2008) concluded that among avian ecologists from the Czech Republic, a high rate of self-reported beer consumption, a proxy of 'social activity', could be the direct cause of a low rate of scientific publication. While he was cautious to acknowledge that the study was correlational, and thus that other possible confounding effects could be at play, he did not mention anything on the shape of the relationship between beer consumption and publication output (Fig. 1 in Grime 2008). A close look at his Fig. 1 shows two clear patterns, a flat relationship below a Box–Cox transformed value for beer consumption of 3.7 and a strong negative trend above this threshold. This suggests a very different pattern for moderate than for heavy drinkers. In order to test if this visual pattern was supported statistically I recovered the data coordinates from the graph on the computer screen using the graphic design package Corel Draw 12. I then performed a breakpoint or piecewise regression with these recovered data (Neter et al. 1996), which allows testing whether there are two or more distinct X–Y relationships across the range of X values (i.e. beer consumption). Other uses of this technique in Ecology can be found elsewhere (Lomolino and Weiser 2001). Because I did not have a good a priori breaking point for the relationship, other than the actual visual pattern, I decided to test whether there was a different pattern in the lower half of X values ($n = 17$) than in the upper half ($n = 17$). This approximated the X-axis breaking point to 3.9 and allowed to have equal sample sizes for each half of the relationship, thus allocating equal a priori statistical

power to each potential relationship (below and above the breaking point). The model for the piecewise regression is as follows (Neter et al. 1996, pp. 370–373): $Y = b_0 + b_1X_1 + b_2(X_1 - 3.9)X_2 + e$, where Y is publication output, X_1 is beer consumption, and X_2 takes the value 1 if $X_1 > 3.9$ and 0 otherwise. Then, I ran a multiple regression to test whether b_1 and b_2 were significant. The slope for the first linear relationship (X below 3.9) considers only b_1 , while the slope for the second relationship will be the sum $b_1 + b_2$, provided that both coefficients are significant. In addition, because there were two data sets (2002 and 2006) in the original publication (Grim 2008), and these were marked different in Fig. 1, I added this information to the model to control for possible differences between data sets by including year as a random variable in a GLM (generalised linear model).

Table 1 shows the results of the re-analysis. The b_1 coefficient is very close to zero and very far from significant, indicating that for the lower half of the beer consumption range we cannot reject the hypothesis that the slope between beer consumption and publication output is different from zero. The b_2 coefficient, on the other hand, was significant and strongly negative, suggesting an important negative effect of beer consumption on publication output beyond the threshold of 3.9 for beer consumption. There were no significant differences between data sets (Year).

My re-analysis of Grim's data set shows how a break to moderate drinkers can be given. This break point would occur at 3.9 Box–Cox units of beer consumption. Although,

Table 1. Breakpoint GLM (general linear model) re-analyzing Grim's (2008) Fig. 1 data testing for a relationship between beer consumption and publication output. The coefficient for the slope of the regression line in heavy drinkers would be the sum of b_1 and b_2 , however, because b_1 is not significantly different from zero, the slope for heavy drinkers is just b_2 (Neter et al. 1996).

Coefficient	Estimate	SE	F (1, 30)	p
b_1 ; moderate drinkers	-0.027	0.147	0.03	0.856
b_2 ; heavy drinkers	-0.714	0.320	4.98	0.033
Year	-0.250	0.179	1.95	0.172

for understandable ethical reasons we will never be able to know what exact quantity of beer consumption per unit of time this Box–Cox value corresponds to (Grim 2008), we can confidently conclude that at the very least, moderate drinking does not seem to affect publication output of Czech avian ecologists. This break is particularly important when it is extrapolated to cultures in which moderate drinking usually accompanies food consumption, such as in most northern Mediterranean countries. Actually, the Mediterranean diet (MD), which includes moderate alcohol consumption, has been shown to be particularly healthy. Individuals that adhere to this diet have overall better survival expectancies, lower risk of cardiovascular disease, lower risk to contract several forms of cancer and a lower chance to contract Alzheimer's disease (Trichopoulou et al. 1995, 2000, 2003, de Lorgeril et al. 1999, Lagiou et al. 1999, Lasheras et al. 2000, Singh et al. 2002, Panagiotakos et al. 2003, Scarmeas et al. 2006). One study has even found that the MD components other than alcohol consumption, and the separate effect of moderate red wine consumption, have complementary beneficial effects on cardiovascular risk factors (Mezzano et al. 2001).

In conclusion, I believe that the statistical breakpoint that I use here could serve to give moderate drinkers, as well as moderately-drinking cultures, a brake from Grim's conclusions.

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