Discussion and Criticism

On Risk Preferences and Curvilinear Utility Curves

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Kuznar's (CA 42:432–40) proposed relationship between social status (wealth), risk preference, and utility bears further scrutiny. The author proposes "that there will be a general curvilinear relationship between wealth and risk sensitivity in which the poor and the wealthy will prefer risky prospects whereas those with more moderate wealth will be risk-averse" (p. 437). He attempts to clarify this claim with his figure 3, which expresses a relationship between status/wealth and utility. Here I reproduce that figure with some expositional additions (fig. 1).

Kuznar's hypothesized relationship actually contradicts the claims/predictions that he apparently derives from it (captured in the above quotation). In fact, figure 1 shows that an individual at a particular wealth level may be risk-averse, risk-prone, or risk-neutral depending on the size of the stakes in the gamble. Consider a focal poor herder facing a choice between two options: (1) a sure gain of three cows and (2) a 50% chance at six cows and a 50% chance of zero cows. From figure 1 we see that U_3 gives the utility received from gaining three cows (option 1) and U_6 the utility received from gaining six cows. To figure out which choice our focal herder makes, assuming that his decisions are governed by expected utility maximization and the proposed relationship, we must calculate and compare the expected utilities from the two options. The expected utility of option 1 is simply U_3, and the expected utility of option 2 is $\frac{1}{2}U_6$—$(0.5)(U_6) + (0.5)(U_0)$; $U_0 = 0$. For a risk-neutral individual, N_6 gives the utility from receiving six cows, and $\frac{1}{2}N_6$ gives the *expected* utility of option 2. Noting that $N_6 = 2U_3$ (because of the linear relationship between them), we see that a risk-neutral individual will be indifferent between the two options. From figure 1, we can also observe that $U_6 > N_6$, which implies that $\frac{1}{2}U_6 > \frac{1}{2}N_6$—meaning that the utility of option 2 is greater than that of option 1 ($\frac{1}{2}U_6 > U_3$). Thus, our herder prefers the risky option (option 2). To generalize the analysis we could simply replace three cows with the variable *w* (6 cows = 2*w*). This part is consistent with Kuznar's analysis.

However, the curious aspect of Kuznar's proposal arises when we ask how our herder will behave if he faces a similar choice involving larger stakes. Suppose he must again choose between two options: (1) 12 cows for sure (4*w*) and (2) a 50% chance at 24 cows (or 0 cows). As before, U_{12} gives both the utility of 12 cows and the expected utility of option 1. U_{24} gives the utility of 24 cows, so $\frac{1}{2}U_{24}$ gives the expected utility of option 2. Again, we see that $N_{24} = 2U_{12}$. However, now figure 1 shows that N_{24} is greater than U_{24}, indicating that the expected utility of option 2 ($\frac{1}{2}U_{24}$) is less than that of option 1 (U_{12}). Thus, increasing the stakes by a factor of four will cause the herder to switch from preferring the gamble to preferring the sure thing—from behaving risk-pronely to behaving risk-aversely. Saying that our herder is generally risk-prone or risk-averse without specifying anything about the stake size does not make sense.

Finally, if we further increase the size of the stakes to a choice between 18 cows (6*w*) for sure and a 50% chance at 36 cows (12*w*), our herder will be completely indifferent—that is, risk-neutral. Figure 1 shows this with the straight line starting at our herder and passing through the utility curve at 18 and 36 cows—the analytics are the same as before, except now $U_{18} = \frac{1}{2}U_{36}$.

To conclude, Kuznar's predictions and intuitions seem inconsistent with those generated by his proposed utility curve. That curve does not predict that poor herders (or any herders) will be generally risk-prone or generally risk-averse. Depending on the stake size of the choices involved, poor herders could be risk-averse, risk-prone, or risk-neutral. It seems to me that the best test of Kuznar's curve is to see if herders (or peasants) change their risk preferences as the stake size of gambles increases—realizing, of course, that for small-stakes gambles *all* proposed utility curves defined over lifetime wealth predict risk-neutrality (Rabin 2001).

Reply

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In the article to which Henrich refers I suggest that the very poor and the very wealthy are attracted to gambles while those of middle wealth are risk-averse, and I monitor this pattern among Aymara herders. Henrich points out that, given the sigmoid utility curve model I propose, both poor and wealthy individuals may favor risky or conservative gambles depending on the size of the payoff.

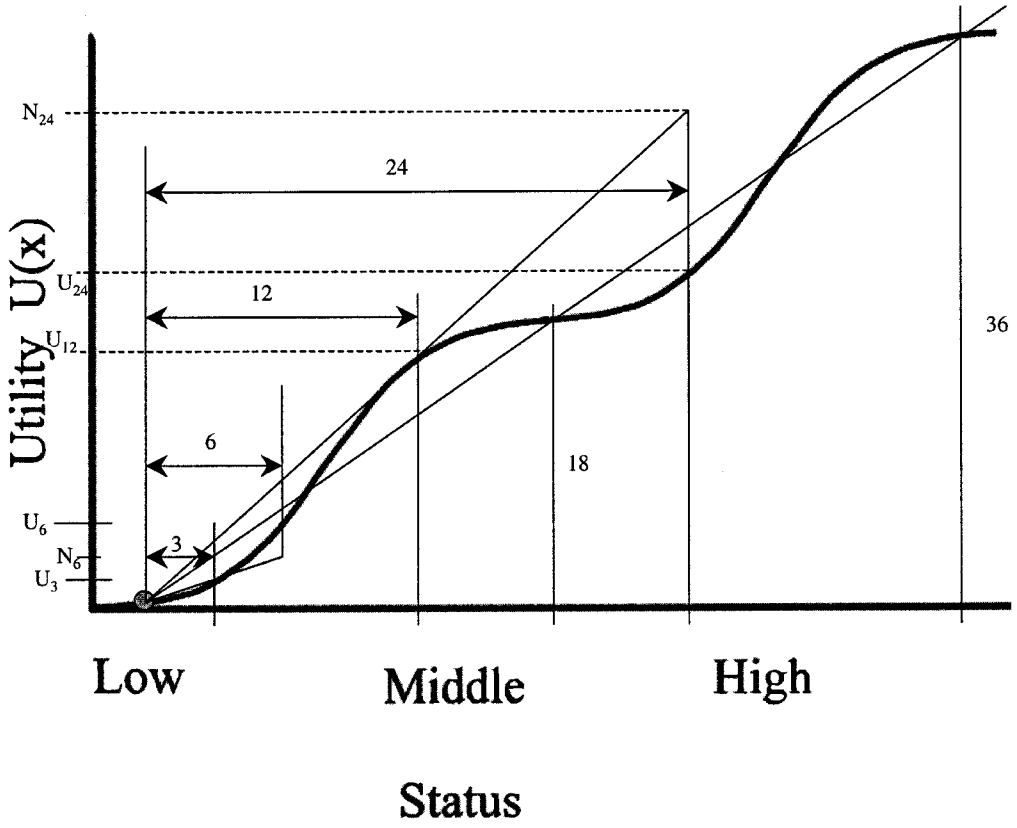

FIG. 1. *Kuznar's proposed relationship between status and utility with additions (used by permission of the author).*

I will argue that the pattern of behavior anthropologists observe (see, e.g., Cancian 1989, Winterhalder, Lu, and Tucker 1999) is due to the fact that the typical size of the gambles people deal with in these studies results in systematically alternating risk-taking and aversion behaviors.

Henrich's observation is correct, although it raises the methodological question of what payoffs to use when eliciting utility values from people and perhaps a theoretical question of what factors lead to the magnitude of status differences that gives rise to sigmoid utility (Friedman and Savage 1948). Given that a person's response depends on the size of the payoff and the person's utility curve, one could elicit all sorts of utility curves. I argue that the curve I propose is valid (not contested by Henrich) because the payoff I use reflects the typical losses my informants experience. Henrich's deductions, while possible, concern gambles in which payoffs exceed the distances between inflection points or oscillations on a sigmoid curve. I argue that herders do not typically encounter such gambles.

The difference between the big uncertain prize and the smaller certain prize was 50 animals in the gamble I used to elicit utility values. Given the average yearly losses and event-specific losses due to drought and snow that I report, this choice of payoff appears particularly appropriate. The goat herders I worked among typically experience about 20% loss in their herd on a yearly basis. Given that mean herd size is 142 goats in the high sierra environment, this translates to an average loss of almost 30 animals a year. In drought years losses can be much greater, exceeding 80 animals. Alpaca herders experience losses closer to 10% per annum. However, when hazards do occur, they tend to be devastating, taking 50% of a herd at times, or about 40 to 50 animals. In either case, herders are used to assessing changes of several score of animals. I would argue that the sigmoid relationship I describe is particularly valid for my case in that the hypothetical gamble I use to elicit risk sensitivity concerns losses and gains of this magnitude.

Henrich's observation highlights that risk sensitivity must be monitored with respect to the payoffs people consider. I am suggesting that anthropologists can provide valid sigmoid utility curves by analyzing the stochastic behavior of resources important to the people they study. As payoff levels, one might consider the variance in the level of a resource or the actual loss incurred when a hazard actually occurs. I suspect that there is a systematic relationship between these measures and the inflection points (and perhaps social statuses) on a sig-

moid curve; I propose that the levels of payoffs that herders encounter tend to be localized well between inflection points on such a curve.

Henrich derives his results by considering payoffs that are more global and perhaps not typical. The extent to which payoffs typically fluctuate in various economies would be a fruitful and important area of research, especially if there is an evolved basis for risk sensitivity as some have suggested (McNamara and Houston 1992, Shafir 2000, Wang 1996). I cannot claim that always and everywhere the poor and the wealthy take risks; I do claim that, considering the typical fluctuations people experience, the poor and the wealthy will take risks with respect to these fluctuations.

Researchers often invoke risk as a cause of behavior, and there are now plenty of empirical demonstrations that people are sensitive to risk. However, there needs to be more research that unites the empirical detail of anthropological fieldwork with models developed by economists. Otherwise, these models will never be fully operationalized and made scientifically testable. People live not in hypotheticals but in the concrete and actual. Given the nature of anthropological fieldwork, anthropologists can monitor these concrete details. These data can then be used to elicit measures of risk sensitivity as I did, and the resulting utility curves will be demonstrably valid. Being sensitive to the actual wins and losses people experience is important because, as Henrich notes, payoffs do matter.

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