

Maria Bolshakova Abstract

This study assessed whether five hypothesized requirements for goal achievement predicted participants' success or failure in achieving a goal. Amazon Mechanical Turk users ($n=182$) were randomly assigned either to identify a recent goal they had accomplished or failed to accomplish. These hypothesized requirements were derived from prior research and include sufficient social support, time availability, enjoyment, accessibility, and motivation (STEAM). We first developed a 44-item scale to measure the presence of these STEAM elements for any particular goal (overall $\alpha=.91$, factor analysis supported the five STEAM variable model). In addition, participants responded to the General Procrastination Scale. Participants' STEAM measure scores were significantly lower for failed goals than achieved goals (Cohen's $d=1.36$, a large effect). A discriminant-function analysis, with STEAM and procrastination scores serving as the predictor variables, was 76.2% accurate in determining which participants succeeded vs. failed in goal achievement. STEAM served as the largest contributor to these predictions. These results have broad implications for overcoming barriers to goal achievement and for helping people create the conditions for success. This approach underscores the benefit of a situationist perspective on goal achievement, rather than attributing goal success/failure to the person.

Claudia Sanchez Abstract

Methane Production and Recovery Opportunities for Small Farmers with Goats and Sheep

Goats and sheep are animals widely used on small farms in Florida and in developing countries since they are less expensive and easier to maintain compared to larger livestock animals. Goat and sheep manure are viable feedstocks for anaerobic digestion to produce methane as a sustainable energy source for small farms. Once the methane is recovered, the manure slurry will likely maintain nutrients that can be applied to organic farms. The objectives of this study are to measure the methane potential of fresh goat and sheep manure, to determine its potential use as an inoculum in small scale anaerobic digesters, and to evaluate the nutrients in the liquid effluent. Approximately one kilogram of freshly excreted manure was collected from local small farms in Gainesville, FL. The manure was characterized for dry matter (DM), organic matter (OM), and chemical oxygen demand (COD). Methane index potential assays were conducted at 35°C over a 40-day period and methane gas was measured directly using the volumetric displacement method with a 3M KOH barrier solution. Experiments were conducted in triplicate along with positive controls including glucose, cellulose and starch. The first experiment determined ultimate methane yields on the both manures, while the second experiment focused on using the slurried pellets as an inoculum for digestion of other material. Nutrient concentrations in the final effluent were also measured to determine its use as a biofertilizer for sustainable organic farming practices. The experiments are still in progress and results will be presented at several conferences in the future.

Sarah Sherman Abstract

Investigations on the cost of resistance in a coevolving population of *E. coli* and T3 phage

We used *Escherichia coli* and T3 phage to study the coevolutionary process between host and virus. Microbes are ideal organisms for such research because they have short generational times and large population sizes, and hence evolve quickly. When infecting *E. coli*, T3 phage targets lipopolysaccharide receptors on the bacteria membrane. This receptor is also involved in important functions for the host fitness, such as the structural integrity of the membrane. Therefore, we hypothesized that gaining resistance to the phage would result in important fitness drawbacks for the bacteria, i.e. that the bacteria would incur a "cost of resistance." We carried a community of clonal populations of bacteria and phage in an environment supplemented with glucose for 17 days, and aliquots were saved daily at 80C. The infection assays revealed that the bacteria evolved resistance to the phage gradually; day 1 bacteria showed no resistance, middle time point bacteria showed partial resistance, and day 17 shows an alternate mechanism of complete resistance. The growth rate experiments for bacteria from days 1, 8, and 17 showed that resistant strains of bacteria presented the greatest fitness costs, with slower growth rates and lower growth plateaus. The experiment enhanced our understanding of the mechanisms of host-parasite coevolution, which includes the fitness costs that arise among the adaptation and counter-adaptation of host and virus.