Motivating Your Students: Beyond the Carrot and Stick
An Overview of Theory and Practice

> Understanding **Behaviorism**: the basics
> ❖ People are driven by <u>positive</u> and <u>negative reinforcement</u>
> ❖ Positive reinforcement: rewards used to reinforce student behavior (i.e. grades, candy, cookies)
> ❖ Negative reinforcement: removing something negative to reinforce student behavior (i.e. less homework if student does well, kicked out of program if student fails)

1. What is our relationship to behaviorism as graduate students?
    a. Common approach in science is behaviorism, stick and the carrot
    b. A familiar example: the "weeder" course.
        i. Toughen up students so they work harder, a common analogy is letting students "drink from a firehose"
        ii. Give them motivation through <u>positive</u> reinforcement (grades), <u>negative</u> punishment (getting kicked out of a program)

2. Behaviorism as it relates to Caltech students
    a. What does behaviorism do well?
        i. For scientists, there is something pure about needing nothing to motivate you beyond the sheer pleasure of learning.
        ii. There will always be somebody who is smarter than you; seeing others succeed shouldn't prevent you from trying to achieve.
        iii. This approach tends to push student limits and exceed expectations
    b. How does a behaviorist approach to teaching affect the undergraduate perception of science at Caltech?
        i. If you can't make it, you're not smart enough to be here
        ii. **The more units you successfully take, the better the student you are**
        iii. Everyone feels as though everyone else is a step ahead. They always feel behind.
        iv. **Science is supposed to be hard and demanding and demoralizing**
    c. Science *is* hard, but learning it does *not* have to be painful
        i. If students don't feel like they can achieve at the level we push them towards, they give up
        ii. If there is no context beyond "learn this, and do well," students have little reason to invest in a course

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Understanding **Social Cognitive Theory**: the basics

❖ Social cognitive theory is based on the idea of <u>triadic reciprocity</u>, in which a person is shaped by the inner thoughts (<u>person</u>), outward actions (<u>behavior</u>), and surrounding <u>environment</u>.
❖ All three of these factors are connected and affect each other, as shown in the figure to the right.
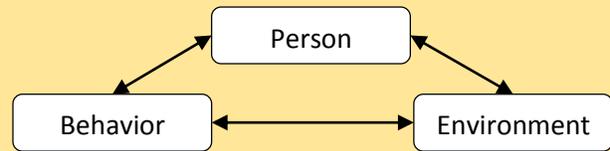
1. Reinforcement and punishment as it relates to triadic reciprocity
   a. When you reinforce good behavior, you change the "environment" to which other students are exposed.
      i. Seeing the benefit for one student influences the other students to want that reinforcement as well
      ii. Seeing positive reinforcement shows that incentives are within reach and give students attainable goals to motivate them to give their best effort
   b. Reinforcement and punishment are similar to the behaviorist approach but are no longer the only way to change a person's motivation.

2. Giving them the tools to succeed
   a. Actively participate in their learning process by <u>modeling</u>
      i. Teach good behavior by example
      ii. SHOW them techniques (i.e. how to titrate something, how to process data, how to use a program)
      iii. Then, watch as they do it themselves and make yourself available to answer questions and to validate success.
      iv. By setting achievable goals for students and validating their progress, you encourage their <u>self-efficacy</u> and <u>self-regulation</u>
         1. <u>Self-efficacy</u>: The ability to complete a task in a specific domain
         2. <u>Self-regulation</u>: The ability to reach goals without outside assistance or influence
   b. Remember the mentors who gave you the basic skills and mastery needed to succeed and continue their legacy

3. Assign tasks in small groups
   a. Give students the opportunity to teach each other and to reach conclusions as a group before walking them through a problem
   b. Students feel more comfortable and more <u>self-efficacious</u> when talking to only their peers
   c. Clarify your thought process when working through a difficult problem to teach them how to draw their own conclusions

Understanding **Sociocultural Theory**: the basics

❖ The goal of sociocultural theory is to meet students where they are in terms of society and culture.
❖ Learning with help from a teacher allows students to access the zone of proximal development, or what a student can do with assistance from a teacher.
❖ The assistance needed to reach this zone is known as scaffolding, where a teacher builds up to new concepts or ideas from ones that students already now.
❖ This theory disregards behaviorism and scales up the lens of social cognitive theory by giving context to the student's performance

What I can't do

What I can do with help

What I can do
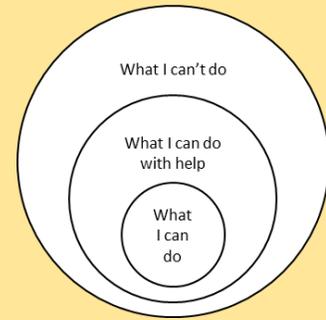
1. How do we put sociocultural theory into practice?
    a. Develop a personal connection with your students
    b. Treat your students like human beings
        i. Understand other aspects of their lives that may inhibit their ability to succeed
        ii. Personal agency: a student's capability to think of and direct actions for a specific purpose
        iii. Listen and show them that you care about them as individuals, not just students. What is the student's life like outside of the classroom?
    c. Provide constructive feedback rather than simply criticizing mistakes

2. Scaffolding to reach the zone of proximal development: how does it work?
    a. Don't assume extensive prior knowledge
        i. Show students that you care about what they have already learned and help them catch up if they do not know something by providing them with resources that you find helpful
        ii. Deficit-based model (an approach that focuses on what is going wrong and tries to fix it) vs. strengths-based model (an approach that focuses on what is going well and tries to reinforce that)
    b. Introduce each individual concept needed to understand a more complex idea, then synthesize these concepts together
        i. Help them make connections to prior knowledge when learning something new
        ii. Reinforce concepts by with the language of the subject
    c. Create a community of learners
        i. Students should respect you and know that you respect them in return
        ii. Gives students the patience and motivation to succeed

What if I am burned out?
1. Rely on your community
    a. Professor, then TAs, then students
    b. All resources can help you reflect upon why do you do this and what motivates you to keep going
2. The counseling center is a great resource if you cannot talk to your professor or fellow TAs about an issue.
3. CTLO is here to help and support you!

Want to learn more about how theory can change your approach to teaching?

❖ Contact CTLO (ctlo@caltech.edu) for more information about the theory of education, including more information on specific approaches to education and motivation.

❖ Consider completing the CPET Certificate of Interest or Certificate of Practice. Learn more on line at teachlearn.caltech.edu/cpet/teachingcertificate

❖ Check out any of these great books and articles:
  ➢ Motivational and self-regulated learning components of classroom academic performance. Paul R Pintrich and Elisabeth V de Groot. Journal of Educational Psychology, 1990 vol. 82 (1) 33-40.

  ➢ Making science a desirable career. J K Polka and K A Krukenberg. Science, 2014 vol. 346 (6215) pp. 1422-1422.

  ➢ From Mindless to Mindful Practice - Cognitive Bias and Clinical Decision Making. Pat Croskerry. N Engl J Med., 2013 vol. 368 (26) pp. 2445-2448.

  ➢ Students' achievement values, goal orientations, and interest: Definitions, development, and relations to achievement outcomes. Allan Wigfield and Jenna Cambria. Developmental Review, 2010 vol. 30 (1) pp. 1-35.

  ➢ Listening to other voices: A description of teacher reflection in the United States. Linda Valli. Peabody Journal of Education. 1997 vol. 72 (1) pp. 67-88.

❖ Additional resources are also available through the CPET collection in the SFL library.