PEOPLE FOR THE ETHICAL TREATMENT OF ANIMALS

Washington
1536 16th St. N.W.
Washington, DC 20036
202-483-PETA

Los Angeles
2154 W. Sunset Blvd.
Los Angeles, CA 90026
323-644-PETA

Norfolk
501 Front St.
Norfolk, VA 23510
757-622-PETA

Info@peta.org
PETA.org

November 10, 2025

Brad Mortensen, PhD
President
c/o Janalyn Brown, Executive Assistant to the President
Utah State University

Via e-mail: brad.mortensen@usu.edu; janalyn.brown@usu.edu

Dear President Mortensen:

Congratulations on your recent appointment as president of Utah State University (USU). I am writing on behalf of People for the Ethical Treatment of Animals—PETA entities have more than 10.4 million members and supporters worldwide—to follow-up on our March 27, 2025, letter[1] that we sent to Interim President, Alan L. Smith, regarding the use of animals in the "Analysis of Behavior: Advanced" undergraduate course (PSY 3400) at Utah State University (USU).[2] **Based on the information provided below and in the enclosed supplemental brief, we urge you to prioritize the replacement of the use of animals in PSY 3400 with effective, non-animal teaching methods, which are the best-practice standard used at other universities.**

Scientific Limitations and Oversight Gaps of Live-Animal Teaching Labs

We are concerned about the continued exploitation of live animals in PSY 3400, where students are asked to confine rats to small metal boxes and condition them to perform mundane tasks (i.e., food seeking) in response to random bursts of bright light[3,4,5] These century-old experiments[6] are not only ethically problematic but also pedagogically flawed. They force intelligent, socially complex

[1] Letter from PETA to USU's interim president, Smith AL., asking to end the use of animals in PSY 3400. March 27, 2025. Accessed October 22, 2025. https://www.peta.org/wp-content/uploads/2025/03/2025-03-27-rebuttal-to-usu-w-supp-brief.pdf.
[2] Utah State University. 2025. *PSY3400 – Analysis of Behavior: Advanced (DSS)*. USU General Catalog. Accessed October 22, 2025. https://catalog.usu.edu/courses/PSY3400.
[3] People for the Ethical Treatment of Animals. (n.d.). *Tell Utah State University to stop tormenting rats in psychology course*. PETA. Accessed October 22, 2025. https://support.peta.org/page/53493/action/1.
[4] People for the Ethical Treatment of Animals. (n.d.). June 30, 2025. *Video: PETA exposes USU for tormenting rats in psych course*. PETA. Accessed October 22, 2025. https://www.peta.org/media/news-releases/video-peta-exposes-usu-for-tormenting-rats-in-psych-course /.
[5] People for the Ethical Treatment of Animals. (n.d.). *Campaign updates: Utah State University*. PETA. Accessed October 12, 2025. https://www.peta.org/news/campaign-updates-utah-state-university/.
[6] Physicians Committee for Responsible Medicine. (n.d.). June 3, 20205. *Lawsuit, billboards call out Macalester College over animal abuse in outdated psych lab*. PCRM. Accessed October 13, 2025. https://www.pcrm.org/news/news-releases/lawsuit-billboards-call-out-macalester-college-over-animal-abuse-outdated-psych.

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animals[7,8] into barren environments and rely on stimuli largely irrelevant to their natural sensory world—rats are primarily guided by smell, not visual cues.[9]

Moreover, our concerns are compounded by the limitations of institutional oversight. The institutional oversight process alone is not enough.[10] In teaching labs, animals are handled by many staff and students with varying degrees of experience. Peer-reviewed scientific studies show that the day-to-day laboratory environment can increase these animals' stress and make the resulting data inaccurate. Specifically, environmental factors, such as light (which is used as one of the stimuli in PSY 3400),[11,12] noise,[13] temperature,[14] cage cleaning and transport,[15] lack of enrichment,[16] social deprivation,[17] human interaction and handling (which is likely commonplace),[18] routine experimental procedures,[19] and even male experimenters,[20] can induce stress and affect the animals' well-being and the outcome of measurements. Additionally, subtle signs of pain are easy for novices to miss in real time, delaying recognition even under good-faith oversight. Because these risks flow from the format, the ethically proportionate response—especially where pedagogically equivalent non-animal methods exist—is to retire live-animal labs and switch to superior simulation models.

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[7] Barnett SA, Spencer MM. Feeding, social behaviour and interspecific competition in wild rats. *Behav*. 1951:3(3), 229–242. Accessed October 22, 2025. https://psycnet.apa.org/record/1952-01970-001.

[8] Ben-Ami Bartal I, Decety J, Mason P. Empathy and pro-social behavior in rats. *Science*. 2011: 334(6061), 1427–1430. Accessed October 20, 2025. https://doi.org/10.1126/science.1210789.

[9] Huckins LM, Logan DW, Sánchez-Andrade G. Olfaction and olfactory-mediated behaviour in psychiatric disease models. *Cell Tissue Res.* 2013, 354, 69–80. Accessed October 20, 2025. https://doi.org/10.1007/s00441-013-1617-7.

[10] Bertrand K. May, 2023. *Unseen suffering: A critical examination of USDA reporting on animals in laboratories*. Science Advancement. Accessed October 14, 2025. https://www.scienceadvancement.org/reflections/unseen-suffering-a-critical-examination-of-usda-reporting-on-animals-in-laboratories/.

[11] Azar TA, Sharp JL, Lawson DM. Effect of housing rats in dim light or long nights on heart rate. *J Am Assoc Lab Anim Sci.* 2008, 47(4), 25-34. Accessed October 29, 2025. https://pmc.ncbi.nlm.nih.gov/articles/PMC2694710/.

[12] Godsil BP, Fanselow MS. Light stimulus change evokes an activity response in the rat. *Learn Behav.* 2004: 32 (3), 299–310. Accessed October 10, 2025. https://link.springer.com/content/pdf/10.3758/BF03196029.pdf

[13] Baldwin AL, Schwartz GE, Hopp DH. Are investigators aware of environmental noise in animal facilities and that this noise may affect experimental data?. Journal of the American Association for Laboratory. *Anim Sci*. 2007, 46(1), 45-51. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/17203916/.

[14] David JM, Chatziioannou AF, Taschereau R, Wang H, Stout DB. The hidden cost of housing practices: using noninvasive imaging to quantify the metabolic demands of chronic cold stress of laboratory mice. *Comp Med*. 2013, 63(5), 386-391. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/24210014/.

[15] Castelhano-Carlos MJ, Baumans V. The impact of light, noise, cage cleaning and in-house transport on welfare and stress of laboratory rats. *Lab Anim*. 2009, 43(4), 311-327. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/19505937/.

[16] Balcombe JP. Laboratory environments and rodents' behavioural needs: a review. *Lab Anim*. 2006, 40(3), 217-235. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/16803640/.

[17] Reinhardt V, Reinhardt A. (2006). Variables, refinement and environmental enrichment for rodents and rabbits kept in research institutions. Animal Welfare Institute. Accessed October 29, 2025. https://awionline.org/sites/default/files/publication/digital_download/awi-variables-refinement-and-environmental-enrichment.pdf.

[18] Gouveia K, Hurst JL. Reducing mouse anxiety during handling: effect of experience with handling tunnels. PloS One. 2013, 8(6), e66401. Accessed October 29, 2025. https://pmc.ncbi.nlm.nih.gov/articles/PMC3688777/.

[19] Balcombe JP, Barnard ND, Sandusky C. Laboratory routines cause animal stress. *J Am Assoc Lab Anim Sci*. 2004, 243(6), 42-51. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/15669134/.

[20] Sorge RE, Martin LJ, Isbester KA, Sotocinal SG, Rosen S, Tuttle AH, Leger P. Olfactory exposure to males, including men, causes stress and related analgesia in rodents. Nature methods, 2014, 11(6), 629. Accessed October 29, 2025. https://pubmed.ncbi.nlm.nih.gov/24776635/.

USU Makes Inaccurate Statements in a Recently Released Video

USU posted a video to its website attempting to justify using rats to model and characterize human behavior is problematic.[21] However, the video's claims that rodents can meaningfully model complex human phenomena—such as addiction or learning—overstate what animal models can capture, given the uniquely human mix of abstract cognition, social context, and economic pressures that rodents do not recapitulate.[22,23] The assertion that animal experiments are essential for student preparedness is also misplaced. On the contrary, students can build marketable, modern skills through non-animal methods now widely promoted across biomedicine and the life sciences industry.[24,25] The video further overlooks animal welfare and scientific validity concerns tied to standard housing; bare cages restrict core rat behaviors (e.g., burrowing, climbing, rearing), which may lead to distress and thus abnormal research outcomes.[26] In sum, the arguments presented in this video lack balanced pedagogy and ignore viable alternatives that meet PSY 3400's learning objectives without live animals.

Public Opposition is Growing—On Campus and Beyond

There is a clear shift away from undergraduate animal labs. On campus, a growing number of USU students and faculty reject the abuse of animals—an attitude administrators should not overlook, as it reflects a broader move toward humane practice that universities are duty-bound to honor. A published letter from a former USU faculty member echoes this call to end classroom experiments,[27] showing that the push for non-animal teaching methods is both internal and community-driven. Nationally, surveys find 52% of Americans[28] oppose all tests on animals

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[21] USU. *USU Psychology Community Shares Successes During COVID-19.* March 26, 2020. Accessed October 14, 2025. https://cehs.usu.edu/psychology/news/usu-psych-community-shares-su
ccesses-during-covid-19.

[22] Goodhue RJ, Liu SC, Cihon TM. Incorporating the portable operant research and teaching laboratory into undergraduate introduction to behavior analysis courses. *J Behav Edu. 2019: 28*(4), 517–541. Accessed October 14, 2025. https://psycnet.apa.org/record/2019-21256-001.

[22]Bish JP, Schleidt S. Effective us
e of computer simulations in an introductory neuroscience laboratory. *J Undergrad Neurosci Educ.* 2008;6(2):A64–A67. Accessed October 14, 2025. https://www.funjournal.org/wp-content/uploads/2015/09/Bish_JUNE_s08.pdf.
Bish JP, Schleidt S. Effective use of computer simulations in an introductory neuroscience laboratory. *J Undergrad Neurosci Educ.* 2008 Spring;6(2):A64-7. https://pmc.ncbi.nlm.nih.gov/articles/PMC3592658/

[23]Evert DL, Goo
dwin G, Stazvener AJ. Integration of computer technology into an introductory-level neuroscience laboratory. *Teach Psychol.* 2005;2(1):69–73. Accessed October 14, 2025. https://eric.ed.gov/?id=EJ724990.

[24]Griffin JD. Technology in the teaching of neuroscience: Enhanced student learning. *Adv Physiol Educ.* 2003;27:146–155. Accessed October 14, 2025. https://journals.physiology.org/doi/pdf/10.1152
/advan.00059.2002

[25]Sheen J, Sutherland-Smith W, Thompson E, et al. Evaluating the impact of simulation-based education on clinical psychology students' confidence and clinical competence. *Clin Psychol*. 2021;1923125. Accessed October 14, 2025. https://aps.onlinelibrary.wiley.com/doi/abs/10.1111/cp.12209.

[25]Naude L, Botha A. It's a virtual child! Postgraduate students' exper
iences in a developmental psychology class. *Perspect Educ.* 2017;35(1):54–65. Accessed October 14, 2025. https://journals.ufs.ac.za/index.php/pie/article/view/3450.
i: 10.1098/rsos.160136.

[27] Rossi M. *Letter: USU should adopt non-animal policy.* HJ News. May 1, 2024. Accessed October 14, 2025. https://www.hjnews.com/opinion/letters_to_editor/letter-usu-should-adopt-non-animal-policy/article_b17fc0b0-07dd-11ef-a8e3-97dece485684.html.

[28] Pew Research Center. 2015. Americans, politics and science issues. Accessed October 14, 2025. https://www.pewresearch.org/science/2015/07/01/americans-politics-and-science-issues/.

and 80–85% believe such experiments should be phased out.[29] Peer institutions face scrutiny and legal challenges over obsolete live-animal coursework,[30] underscoring how out of step these methods have become.

Request to Modernize PSY 3400

There is no legal, scientific, or ethical justification to harm animals to prepare students for careers in brain science. It is also critical that young psychologists and neuroscientists discuss the problems associated with animal use in education and are given a breadth of non-animal tools; otherwise, we risk fostering disengagement regarding issues of public welfare[31] and alienating talented, compassionate people from the field.

We hope that you, as USU's new president, will affirm your support for effective and widely used,[32,33] non-animal methods in undergraduate psychology and call for the phase-out of this archaic use of live animals.

You can contact me directly via e-mail at MaggieW@peta.org. Thank you for your consideration of this important matter, and I look forward to your reply.

Sincerely,

Maggie Wiśniewska, PhD
Science Policy Advisor - International Laboratory Methods Division
Laboratory Investigations Department

Enclosure: Supplemental Brief: Replacing Animal Use in Undergraduate Psychology Education

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[29] Physicians Committee for Responsible Medicine. (*n.d.*). Animal testing survey. Physicians Committee for Responsible Medicine.Accessed March 24, 2025. https://pcrm.widen.net/s/qzfxtfh7bw/animal-testing-survey.

[30] Adler, E. June 4, 2025. *Alum sues Macalester over animal cruelty concerns in lab experiments*. Star Tribune. Accessed October 14, 2025. https://www.startribune.com/alum-sues-macalester-over-animal-cruelty-concerns-in-lab-experiments/601364871.

[31] Cech EA. Culture of Disengagement in Engineering Education? *Sci Technol Human Values*. 2014. 39(1), 42–72. Accessed October 14, 2025. https://www.jstor.org/stable/43671164.

[32] Michigan State University. *(n.d.). CyberRat teaching materials*. MSU Applied Behavior Analysis Collective. Accessed November 3, 2025. https://mtb.msu.domains/cyber-rat-teaching-materials/.

[33] Studocu. *(n.d.). CyberRat lab assignment 1: Observation and behavior definitions [Unpublished student work from Kean University]*. Accessed November 3, 2025. https://www.studocu.com/en-us/document/kean-university/general-psychology/cyberrat-lab-assignment-1-observation-and-behavior-definitions/123868313.

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Washington
1536 16th St. N.W.
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202-483-PETA

Los Angeles
2154 W. Sunset Blvd.
Los Angeles, CA 90026
323-644-PETA

Norfolk
501 Front St.
Norfolk, VA 23510
757-622-PETA

Info@peta.org
PETA.org

Supplemental Brief: Replacing Animal Use in Undergraduate Psychology Education

American Psychological Association Supports Nonanimal Training

The American Psychological Association's (APA) "Guidelines for Ethical Conduct in the Care and Use of Nonhuman Animals in Research" states, "Consideration should be given to the possibility of using nonanimal alternatives."[1] In its "Resolution on the Use of Animals in Research, Testing, and Education," the APA mandates that "the development and use of complementary or alternative research or testing methodologies, such as computer models, tissue, or cell cultures, be encouraged where applicable and efficacious."[2] Another APA document titled, "The Ethical Principles of Psychologists Code of Conduct," indicates that experiments that inflict pain, stress, or privation in animals can only proceed, in part, "when an alternative procedure is unavailable."[3] In the case of the "Analysis of Behavior: Advanced" undergraduate course (PSY 3400) at Utah State University (USU), nonanimal methods are widely available as described below.

Experts, Students, and the Public Oppose the Use of Animals in Education

Depending on the procedure, up to 60% of psychology students oppose the use of animals in psychology education.[4] Many psychologists and psychology students believe that live animal experimentation should not be required in undergraduate psychology courses[5] or that animal experimentation is becoming less of a focal point in psychology.[6] Many college-aged adults are opposed to experiments on animals.[7,8] A Pew Research Center survey found that 52% of Americans oppose all tests on animals,[9] and a Morning Consult survey found that the vast majority—80% to 85%—of U.S. residents think experiments on animals should be phased

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[1] American Psychological Association. *(n.d.).* Guidelines for ethical conduct in the care and use of nonhuman animals in research. 2022: 1-5. Accessed November 3, 2025. https://www.apa.org/science/leadership/care/animal-guide.pdf.

[2] American Psychological Association. *(n.d.).* Resolution on the use of animals in research, testing, and education. 1990. Accessed November 3, 2025. https://www.apa.org/science/leadership/care/animal-resolution.pdf.

[3] American Psychological Association. *(n.d.).* The Ethical Principles of Psychologists Code of Conduct. Accessed November 3, 2025https://www.apa.org/ethics/code/principles.pdf.

[4] Cunningham PF, Randour ML. Animals in Psychology Education: A Guide to Understanding the Issue of Student Choice Handbook. Accessed November 3, 2025. Student_Choice_in_the_Psychology_Classroom_A_Handbook_1999.pdf.

[5] Cunningham. 2000.

[6] Wieczorek O, Unger S, Riebling J, Erhard L, Koß C, Heiberger R. Mapping the field of psychology: Trends in research topics 1995–2015. *Scientometrics*. 2021: 126, 9699–9731. Accessed November 3, 2025. doi.org/10.1007/s11192-021-04069-9.

[7] Goodman JR, Borch CA, Cherry E. Mounting opposition to vivisection. *Contexts.* 2012:11(2), 68-69. Accessed November 3, 2025. doi:10.1177/1536504212446466.

[8] Plous S. Attitudes toward the use of animals in psychological research and education: results from a national survey of psychology majors. *Psychol Sci*. 1996: 7(6), 352-358. Accessed November 3, 2025. https://doi.org/10.1111/j.1467-9280.1996.tb00388.

[9] Pew Research Center. August 16, 2018. Americans are divided over the use of animals in scientific research. Pew Research Center. Accessed November 3, 2025. https://www.pewresearch.org/short-reads/2018/08/16/americans-are-divided-over-the-use-of-animals-in-scientific-research/.

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out and tax dollars spent on non-animal studies instead.[10] Therefore, employing nonanimal educational tools creates an engaging, inclusive, and safe learning environment for instructors and students, including those uncomfortable with animal experimentation.[11,12]

Animal-free Psychology Training Tools are Available and Effective[13]

Below are various interactive methods that allow students to design and conduct experiments, observe animal behavior in simulated and real-world settings, and gather and analyze data—without harming animals. These resources provide diverse and engaging learning experiences in psychology education, combining theoretical knowledge with practical simulations to enhance the understanding of operant conditioning and behavioral analysis:

- **Sniffy the Virtual Rat**[14]: This interactive simulation of a rat in B.F. Skinner's operant chamber allows psychology and neurobiology students to explore various aspects of operant and classical conditioning through experimentation without exploiting animals.[15] Users can archive the data files and graphical outputs generated during the experiments and access them for future manipulation or extraction.[16] A team of researchers at the University of Houston-Victora reported that "[c]ompared with standard study, using this virtual laboratory significantly increased students' comprehension of concepts, raising their comprehension scores from 63% to 76%."[17]
- **SniffyPro**[18]: This version of Sniffy [is] an advanced alternative to Sniffy the Rat simulator and is suitable for the upper year and advanced college courses in behavior and learning without using live animals.[19] This tool allows students to "perform 'classic' experiments that closely resemble those discussed in standard textbooks on the psychology of learning. Using SniffyPro, students can perform exercises that demonstrate most of the major phenomena of operant and classical conditioning."[20] Simulated examples of classical conditioning phenomena "include: acquisition, extinction, spontaneous recovery, the effects of manipulating the intensity of the [conditioned (CS) and unconditioned (US) stimuli], compound conditioning, blocking, overshadowing, over-expectation, inhibitory conditioning, sensory preconditioning, higher-order/background conditioning, the nature of the classical-

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[10] Physicians Committee for Responsible Medicine. *(n.d.).* Animal testing survey. Physicians Committee for Responsible Medicine. Accessed November 3, 2025. https://pcrm.widen.net/s/qzfxtfh7bw/animal-testing-survey.

[11] Bbalcombe J. The use of animals in higher education: problems, alternatives, and recommendations. Hynabe Sicuet Press. Washington, DC, USA. Accessed November 3, 2025. http://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1005&context=ebooks

[12] Kahrass H, Pietschmann I, Mertz M. Why Do I Choose an Animal Model or an Alternative Method in Basic and Preclinical Biomedical Research? A Spectrum of Ethically Relevant Reasons and Their Evaluation. *Animals*. 2024: 14*(*4), 651. Accessed November 3, 2025. https://www.mdpi.com/2076-2615/14/4/651.

[13] Goolkasian P, Ludwig TE, Froman R. Software Tools in the Teaching of Psychology Best Resources List. January 15, 2005. Accessed November 3, 2025. https://teachpsych.org/Resources/Documents/otrp/pedagogy/bestlists.pdf.

[14] Sniffy the Virtual Rat. *(n.d.).* Accessed November 3, 2025. http://www.sniffythevirtualrat.com/.

[15] Graham J, Alloway T, Krames L. Sniffy, the virtual rat: Simulated operant conditioning. *Behav Res Methods Instrum Compu.* 1994: 26, 134–141. Accessed November 3, 2025. https://doi.org/10.3758/BF03204606.

[16] Jakubow JJ. Review of the Book Sniffy the virtual rat pro version 2.0. *J Exp Anal Behav*. 2007: 87(2), 317–23. https://pmc.ncbi.nlm.nih.gov/articles/PMC1832165/.

[17] Foreman N. Virtual reality in psychology. *Themes Sci Technol Educ.* Special Issue. 225-252. Accessed November 3, 2025. https://files.eric.ed.gov/fulltext/EJ1131318.pdf

[18] Sniffy the Virtual Rat (n.d.). Why Use Sniffy? Accessed November 3, 2025. https://www.sniffythevirtualrat.com/index.htm.

[19] Mac App Store Preview. Sniffy Pro. Accessed November 3, 2025. https://apps.apple.com/us/app/sniffypro/id1528526105?mt=12.

[20] *Ibid.*

conditioning association…, and CS and US pre-exposure effects."[21] In addition, examples of simulated "operant conditioning phenomena include: maze training; shaping; extinction; spontaneous recovery; primary and secondary reinforcement; variable-interval; variable-ratio; fixed-interval, and fixed-ratio schedule effects; the partial-reinforcement effect; simple and complex stimulus-discrimination learning; stimulus generalization; and the effects of punishment on extinction."[22] Additionally, "[a]n integrated manual with step-by-step instructions makes the program accessible even to unsophisticated computer users."[23]

- **(AI)^2, Inc.'s CyberRat Operant Laboratory Simulations Program**[24]: CyberRat is a digital, fully interactive video of a real animal in an operant conditioning chamber. The program database contains over 1,600 behavioral video clips seamlessly played back in unique sequences using stochastic algorithms.[25] Student record keeping and data archives are maintained to give instructors easy access to student progress summaries. CyberRat "serves as a functional supplement and total replacement for various live animal laboratory exercises using rats when used in introductory psychology laboratories."[26] It's "as close to an actual behaving animal as you can get,"[27] offering "a near-perfect illusion of being a single animal that quite realistically demonstrates basic operant conditioning phenomena embedded in a flow of natural behaviors."[28]
- **The Learning Simulator**[29]: The Learning Simulator is an open-source software that simulates many learning theories in humans and other animals, including the acquisition and extinction of behavior, learning of behavioral sequences, and various social-learning scenarios.[30] It is particularly valuable in teaching undergraduate psychology as it provides a hands-on understanding of learning theories such as Pavlovian conditioning without the need for animal subjects, making it an ethical alternative for educational purposes. Beyond education, the Learning Simulator is often used in fundamental research to explore learning phenomena in humans and animals, with applications in animal welfare (e.g., behavioral problems in domestic animals) and clinical psychology of anxiety or depression.[31] This simulator has been featured in several scientific publications,[32,33,34] and used as a teaching tool at the master's program in ethology at Stockholm University, the veterinary program at

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[21] *Ibid.*
[22] *Ibid.*
[23] *Ibid.*
[24] (AI)^2 Inc. *(n.d.).* CyberRat. Accessed November 3, 2025. https://www.ai2inc.com/HomeProducts/cyberrat.html.
[25] Norecopa. CyberRat: Operant Laboratory Simulation Program. April 16, 2020. Accessed November 3, 2025. https://norecopa.no/norina/cyberrat-operant-laboratory-simulations-program.
[26] Ray R, Miraglia K. A sample of CyberRat and other experiments: Their pedagogical functions in a learning course. *J Neurosci Res*. 2011: 9, 44-61. Accessed November 3, 2025. https://www.semanticscholar.org/paper/A-Sample-of-CyberRat-and-Other-Experiments-%3A-Their-Ray-Miraglia/6d3efdba8b82953d5fb91c48f7eb73f3640c60b3.
[27] Phelps B. How close to real can a non-real CyberRat behave? *Behav Phil*. 2011: 39/40, 309-315. Accessed November 3, 2025. https://www.proquest.com/scholarly-journals/how-close-real-can-non-cyberrat-behave/docview/1564231342/se-2.
[28] Iverson I. Commentary on CyberRat. *Behav Phil*. 2011: 39/40, 303-307. https://www.jstor.org/stable/behaphil.39-40.303,
[29] The Learning Simulator. *(n.d.).* Accessed November 3, 2025. https://www.learningsimulator.org/.
[30] The Learning Simulator. *(n.d.).* Accessed November 3, 2025. https://www.learningsimulator.org/education.
[31] The Learning Simulator. *(n.d.).* Accessed November 3, 2025. https://www.learningsimulator.org/.
[32] Ghirlanda S, Lind, J, Enquist, M. A-learning: A new formulation of associative learning theory. *Psychon Bull Rev*. 2020; 27, 1166-1194. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/32632888/.
[33] Lind J. What can associative learning do for planning? *R Soc Open Sci*. 2018;5, 180778. Accessed November 3, 2025. https://royalsocietypublishing.org/doi/10.1098/rsos.180778
[34] Lind J, Ghirlanda S, Enquist M. Social learning through associative processes: A computational theory. *R Soc Open Sci*. 2019;6, 181777. Accessed November 3, 2025. https://doi.org/10.1098/rsos.181777.

the Swedish University of Agricultural Sciences, and the psychology department at Brooklyn College, City University of New York.[35]

- **SuperLab**[36,37]: SuperLab is a general-purpose experiment generator for psychology experiments involving human participants. It lets students experiment with various psychological phenomena, including perception and attention, memory, reasoning, perceptual representation, and representation of meaning, without a need for programming skills. It's an excellent alternative to animal use. SuperLab platform supports text, picture, audio, video, and gaze-tracking components but does not require prior programming skills. Beyond being a user-friendly teaching tool, SuperLab has been used in numerous peer-reviewed studies, demonstrating its reliability and effectiveness in experimental research. For example, it has been employed in studies examining cognitive processes, reaction times, and perceptual tasks, showcasing its broad utility in scientific investigations.[38]
- **PsychMate**[39]: PsychMate is a "set of software tools for undergraduate psychology students to [develop], run …, and analyze [realistic] experiments … in the areas of perception, cognition, social psychology, human factors, and cognitive neuroscience."[40,41] While using this platform, students can work independently or collaborate with others. The automatic spreadsheet analysis forms allow students to analyze their data and create presentations and Web pages.[42] Associated applications such as the Brain-Tutor and BrainViewer teach brain anatomy and permit students to analyze fMRI brain imaging data from subjects who have performed memory experiments similar to those covered by PsychMate users.[43,44] According to one study, "PsychMate has been used in 83 classes in which 1,533 students submitted 5,464 completed experiments with few (less than 1%) requests for help and a positive rating of the research experience."[45]
- **E-Prime**[46]: This is a widely used software package in educational and research settings. It enables the creation and execution of complex experimental paradigms, such as classical and operant conditioning.[47] Students can engage in real-world research practices, from hypothesis testing to data analysis, gaining theoretical knowledge and practical experience for careers in

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[35] Jonsson M, Ghirlanda S, Lind J, Vinken V, Enquist M. Learning Simulator: A simulation software for animal and human learning. *J Open Source Softw*. 2021: 6(58), 2891. Accessed November 3, 2025. doi:10.21105/joss.02891.
[36] Cedrus. *(n.d.).* Enjoy making experiments. Accessed November 3, 2025. https://cedrus.com/superlab/index.htm.
[37]Haxby JV, Parasuraman R, Lalonde F, Abboud H. SuperLab: General-purpose Macintosh software for human experimental psychology and psychological testing. *Behav Res Methods Instrum Comput.* 1993: 25(3), 400–405. Accessed November 3, 2025. https://doi.org/10.3758/BF03204531
[38] Cedrus. *(n.d.).* A sample of research papers that used SuperLab. Accessed November 3, 2025. https://cedrus.com/superlab/publications.htm.
[39] PsychMate. *(n.d.).* Psychology Software Tools. Accessed November 3, 2025. https://pstnet.com/products/psychmate/.
[40] Eschman A, James JS, Schneider W, Zuccolotto A. PsychMate: Providing psychology majors the tools to do real experiments and learn empirical methods. *Behav Res Methods*. 2005: 301–311. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/16173128/.
[41] Experiments for Teaching Psychology. *(n.d.).* Accessed November 3, 2025. https://pstnet.com/wp-content/uploads/2017/09/PsychMateProductSheet.pdf.
[42] Eschman et al. 2005.
[43] *Ibid.*
[44] Experiments for Teaching Psychology. *(n.d.).* Accessed November 3, 2025. https://pstnet.com/wp-content/uploads/2017/09/PsychMateProductSheet.pdf.
[45] Eschman et al. 2005.
[46] Psychology Software Tools, Inc. *(n.d.).* E-Prime® Stimulus Presentation Software. Psychology Software Tools. Accessed November 3, 2025. https://pstnet.com/products/e-prime/.
[47] NeuroSpec AG. *(n.d.).* E-Prime 3.0. NeuroSpec AG. Accessed November 3, 2025. neurospec.com/products/e-prime-3

psychology and related fields. E-Prime's user-friendly interface and comprehensive tools allow students to design and modify experiments without advanced programming skills, making it accessible for beginners and powerful for advanced users. The System for Teaching Experimental Psychology (STEP) project, funded by the National Science Foundation, uses E-Prime to deliver instructional materials and classic experiments for teaching experimental psychology at various educational levels, including undergraduate and graduate courses.[48] Many universities, including Carnegie Mellon University and George Mason University, incorporate E-Prime into their psychology curricula for lab courses and research projects, helping students develop a deeper understanding of research methods and enhancing their technical skills.[49] Finally, this tool has been instrumental in generating numerous primary publications.[50]

- **PsyToolkit**:[51,52] PsyToolkit is a versatile software platform designed for creating and running a wide range of custom psychological experiments, including undergraduate psychology courses.[53] The platform allows for the simulation of real-world scenarios where students can observe and analyze the effects of reinforcement, punishment, and behavior shaping.[54] Its user-friendly interface and robust data analysis capabilities enable students to bridge the gap between theoretical knowledge and practical application, enhancing their understanding of behavior modification principles.[55] This experiential learning approach deepens comprehension and fosters critical thinking and research skills essential for budding psychologists. One student using PsyToolkit said, "It is very intuitive and even I with little programming knowledge can learn easily and quickly. I recently told my professor that I could imagine using this for my future doctorate. A really good website!"[56]
- **Neuronify**:[57] Neuronify is an educational simulation software facilitating interactive learning about neuronal networks. It provides an accessible platform for students, even those without computational experience, to gain insights into key neuronal processes of memory formation and learning, such as synaptic input integration and feedback inhibition. In a classroom setting, Neuronify can be used on smartphones, tablets, and personal computers, allowing students to build and explore neuronal circuits by adjusting parameters through an intuitive menu. The software's plug-and-play environment enables hands-on learning, where students can use their device cameras as visual sensors or manipulate touch screens to experiment

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[48] MacWhinney B, St. James J, Schunn C, Li P, Schneider W . STEP—A System for Teaching Experimental Psychology using E-Prime. *Behav Res Methods Instrum Comp.* 2001: 33, 287–296. Accessed November 3, 2025. https://link.springer.com/article/10.3758/BF03195379.

[49] MacWhinney et al. 2001.

[50] Psychology Software Tools, Inc. *(n.d.).* E-Prime® Stimulus Presentation Software. E-Prime Publications Accessed November 3, 2025. https://pstnet.com/e-prime-publications/

[51] PsyToolkit. *(n.d.). PsyToolkit News.* Accessed November 3, 2025. https://www.psytoolkit.org/

[52] Stoet G. PsyToolkit: A software package for programming psychological experiments using linux. *Behavior Research Methods*, 2010: 42(4), 1096–1104. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/21139177/.

[53] Stoet G. PsyToolkit: A Novel Web-Based Method for Running Online Questionnaires and Reaction-Time Experiments. *Teach Psychol.* 2017: 44(1), 24-31. Accessed November 3, 2025. https://doi.org/10.1177/0098628316677643

[54] PsyToolkit. *(n.d.). PsyToolkit: Free online psychology experiments*. Accessed November 3, 2025. https://www.psytoolkit.org/

[55] *Ibid.*

[56] PsyToolkit. *(n.d.).* PsyToolkit News. Accessed November 3, 2025. https://www.psytoolkit.org/#_search_website.

[57] Neuronify is an educational neuronal network app. *(n.d.).* Accessed November 3, 2025. https://ovilab.net/neuronify/.

with and understand complex neuronal behaviors.[58] This interactive approach enhances engagement and deepens understanding of neuroscience concepts.

- **Testable**[59]: Testable is a browser-based experiment builder that lets instructors and students create, run, and share classic psychology experiments (including analogs of operant tasks in a Skinner box) without coding or live animals. Testable includes ready-to-use templates (e.g., memory and decision-making tasks), point-and-click editors for stimuli and instructions, precise reaction-time recording, and built-in randomization/counterbalancing for within- or between-subjects designs. This tool can run on any modern laptop/phone. Testable integrates data exports (CSV), so students generate their own datasets for analysis in JASP/jamovi/R. Instructors using Testable can duplicate assignments, set participation windows, and monitor progress—all while delivering the same experimental-design, measurement, and analysis skills as animal labs, but in a modern, fully animal-free workflow.[60]
- **Gorilla Experiment Builder**[61]**:** Gorilla lets instructors replace live-animal Skinner box labs with browser-based operant-style tasks that students can design, run, and analyze without coding. This platform supports stimulus–response experiments with precise reaction-time logging, configurable feedback/reinforcement**,** and built-in randomization/counterbalancing and create full lab workflows and exports trial-level datasets for analysis in JASP/R.[62] It is also considered appropriate for undergraduate methods labs including students independently building experiments and collecting publishable data.[63] Finally, for instructors, Gorilla provides ready teaching materials and onboarding to scale across large cohorts.[64,65]
- **The Diffuse Discrepancy Model (DiffDiscM)**[66]: This simulator is an open-source neural network model designed specifically for researchers in behavioral sciences. DiffDiscM[67] has been applied in theoretical, experimental, and predictive research across various behavioral topics, including conditioning, extinction, spontaneous recovery, choice, instrumental-Pavlovian transfer, inhibition, overshadowing, probabilistic learning, contextual learning, and selective associations, among others.[68,69] DiffDiscM also provides insights into gross neuroanatomy, including the roles of dopamine and the hippocampus in behavior. Finally, the neurocomputational aspect makes this simulator useful for studying artificial intelligence

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[58] Dragly SA, Hobbi Mobarhan M, Våvang Solbrå A, Tennøe S, Hafreager A, Malthe-Sørenssen A, Fyhn M, Hafting T, Einevoll GT. Neuronify: An Educational Simulator for Neural Circuits. *eNeuro.* 2017: 4(2), ENEURO.0022-17. Accessed November 3, 2025. https://www.eneuro.org/content/4/2/ENEURO.0022-17.2017.

[59] Testable. *(n.d.). Testable*. Accessed November 3, 2025. https://www.testable.org/.

[60] Rezlescu C, Danaila I, Miron A, Amariei C. More time for science: Using Testable to create and share behavioral experiments faster, recruit better participants, and engage students in hands-on research. *Prog Brain Res. 2020: 253*, 243–262. Accessed November 3, 2025. https://doi.org/10.1016/bs.pbr.2020.06.005.

[61] Gorilla. *(n.d.).* Gorilla. Accessed November 3, 2025. https://gorilla.sc/.

[62] Gorilla. *(n.d.).* Task Builder. Accessed November 3, 2025. https://gorilla.sc/task-builder.

[63] Gorilla. *(n.d.).* Timing performance of online experiments. Accessed November 3, 2025. https://gorilla.sc/blog/timing-performance-of-online-experiments

[64] Gorilla. *(n.d.).* Teaching with Gorilla. Accessed November 3, 2025. https://gorilla.sc/teaching.

[65] Gorilla. *(n.d.).* Open teaching materials. Accessed November 3, 2025. https://support.gorilla.sc/support/educational-resources/open-teaching-materials?utm_source=chatgpt.com#overview.

[66] Miguel2862. *(n.d.).* DDM-UI. GitHub. Accessed November 3, 2025. https://github.com/miguel2862/DDM-UI/tree/main.

[67] Donahoe JW, Burgos JE, Palmer DC. A selectionist approach to reinforcement. *J Exp Anal Behav*. 1993: 60, 17-40. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/8354965/.

[68] Miguel2862.

[69] Aguayo-Mendoza M, Buriticá J, Burgos JE. Autoshaped impulsivity: Some explorations with a neural network model. *Behav Processes.* 2024: 218. Accessed November 3, 2025. https://www.sciencedirect.com/science/article/abs/pii/S037663572400055X?via%3Dihub.

and machine learning.[70] When working with DiffDiscM, students or researchers can select a number of model neurons and create networks of choice, apply various contingencies (e.g., a stimulus reinforced), and automatically observe learning curves in real-time, eliminating the need for time-consuming data analysis. Experiments can be customized to test different neural networks or stimuli, and results are immediately available for evaluation.

- **Virtual reality (VR) tool**[71]: In a pilot study, faculty and staff at Southern New Hampshire University (SNHU) in Manchester, New Hampshire, tested the effectiveness of VR in an undergraduate psychology course by using Synapse VR experience—a custom tool developed in collaboration with a global production studio, Unit9. The goal was to create an immersive exercise on neural transmission and conduction to help students understand "the interplay between neural communication, neural circuits and psychological activity and behavior"[72] and "apply biopsychology to other areas of psychology (e.g., mental health, addiction and development) and disciplines outside of psychology (e.g., economics, law, computer science artificial intelligence and education)."[73] The faculty at SNHU concluded that they were encouraged to explore the use of VR in higher education and see it as "the future of learning."[74] In another study, researchers at the University of Central Missouri studied the benefits of using VR technology in an abnormal psychology course. Specifically, they examined if participating in a VR session designed to help clients overcome the fear of flying would enhance [student] comprehension of such psychological treatments. The authors concluded that "incorporating firsthand experience with evidence-based psychological treatments"[75] [proved helpful] "in enhancing students' understanding [and appreciation] of such treatments."[76] Such immersion is essential in higher education because, according to a group of psychology educators at the Open University of the Netherlands, in Heerlen, introductory psychology courses still "lack application of knowledge in solving work-based problems."[77]

These resources provide a range of superior options for interactive, animal-free learning experiences in psychology education. They offer a blend of theoretical knowledge and practical simulation that can enhance the understanding of operant conditioning and behavioral analysis.

Beyond computer-based learning methods, psychology educators have developed other pedagogical tools that allow students to observe and document the behavior of humans and other animals using harm-free methods, including the following:

- **Nonanimal classroom experiments:** The principles of operant conditioning can and should be applied to human subjects, and educators have developed a range of programs for

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[70] Burgos JE. Chapter 4-Evolving Artificial Neural Networks in Pavlovian Environments. *Adv Psychol.* 1997: 58–79. Accessed November 3, 2025. https://www.sciencedirect.com/science/article/abs/pii/S0166411597800908.
[71] Flynn C, Frost P. Making VR a Reality in the Classroom. April 16, 2021. Accessed November 3, 2025. https://er.educause.edu/articles/2021/4/making-vr-a-reality-in-the-classroom
[72] *Ibid.*
[73] *Ibid.*
[74] *Ibid.*
[75] Stark-Wroblewski K, Kreiner DS, Boeding CM, Lopata AN, Ryan JJ, Church TM. Use of virtual reality technology to enhance undergraduate learning in abnormal psychology. *Teach Psychol.* 2008: 35, 343-348. Accessed November 3, 2025. https://doi.org/10.1080/00986280802374526.
[76] *Ibid.*
[77] Hummel HGK, Nadolski RJ, Eshuis J, Slootmaker A, Storm J. Serious game in introductory psychology for professional awareness: Optimal learner control and authenticity. *Br J Educ Technol*. 2021: 52, 125-141. Accessed November 3, 2025. https://doi.org/10.1111/bjet.12960.

applying these concepts in classroom laboratory activities.[78,79] In contrast to using other animals as models of human behavior, allowing students to learn basic psychological principles with virtual software and then apply them to studies involving human volunteers may be the most comprehensive way to teach basic research principles, ethics, and applications in an undergraduate psychology course. The following examples are well-established classroom experiments.

- **Pavlovia**[80]: This is an online platform designed for researchers in the behavioral sciences to run, share, and explore experiments. Initially created as a repository for PsychoPy experiments, Pavlovia now supports other open-source tools like "jsPsych" and "lab.js." Researchers can store their work on Pavlovia's repository, manage versions, track issues, and communicate with colleagues. The platform ensures secure data handling with encrypted connections and offers various participant recruitment options. Pavlovia's open architecture and commitment to open science make it a valuable resource for the research community. Pavlovia is also an excellent tool for teaching because it allows students to design, run, and analyze experiments in a user-friendly online environment. Instructors can use Pavlovia to create interactive and engaging coursework to help students gain hands-on experience with real research methods.
- **The Shaping Game**[81]: This game allows students to design psychology experiments and practice with some operant conditioning principles, such as the effects of positive reinforcement, positive punishment, superstitious behavior, and operant extinction, with little additional equipment.[82] A simple application of the shaping game may be where the shaper (student A) manipulates the movement behavior of the learner (student B) via the clicker or a piece of candy as conditioning reinforcers. The learner "may start by standing away from the chairs in the room. As the learner leans, looks, or moves toward a chair, the shaper [may] provide a click as a reinforcer."[83] With time, the learner should recognize the conditioning reinforcers, which exhibit more movement towards a chair and eventually sitting in the chair (target behavior).
- **The Portable Operant Research and Teaching Laboratory (PORTL)**[84]: This is an interactive educational game designed to simulate Skinner's operant chamber without exploiting animals. PORTL helps students learn about operant conditioning and other behavioral principles such as reinforcement, punishment, shaping, and extinction.[85] It uses "a

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[78] Shields C, Gredle M. A problem-solving approach to teaching operant conditioning. *Teach Psychol*. 2003: 30, 114-116. Accessed November 3, 2025. http://dx.doi.org/10.1207/S15328023TOP3002_06.

[79] Chrisler JC. Conditioning the instructor's behavior: A class project in psychology of learning. *Teach Psychol*. 1998: 15, 135–137. Accessed November 3, 2025. https://www.researchgate.net/publication/233222076_Conditioning_the_Instructor's_Behavior_A_Class_Project_in_Psychology_of_Learning.

[80] Pavlovia. *(n.d.).* Accessed November 3, 2025. https://pavlovia.org/#main

[81] Morgan WG. The shaping game: A teaching technique. *Behav Ther*. 1974: *5*, 271-272. Accessed November 3, 2025. https://psycnet.apa.org/doi/10.1016/S0005-7894(74)80144-9.

[82] Swisher M. April 3, 2024. *Impactful reading for new behavior analysts*. Behavior Analysis Blogs. Accessed November 3, 2025. https://behavioranalysisblogs.abainternational.org/2024/04/03/impactful-reading-for-new-behavior-analysts/.

[83] *Ibid.*

[84] Hunter M, Rosales-Ruiz J. What is PORTL? Behavior Explorer. Published 2019. Accessed November 3, 2025. https://behaviorexplorer.com/articles/portl-intro/.

[85] Goodhue RJ, Liu SC, Cihon TM. Incorporating the portable operant research and teaching laboratory into undergraduate introduction to behavior analysis courses. *J Behav Edu. 2019: 28*(4), 517–541. Accessed November 3, 2025. https://doi.org/10.1007/s10864-019-09323-y.

collection of small objects, a clicker to select behavior, and small blocks as reinforcers."[86] Students need only minimal instructions to start playing. However, as they gain more experience with the game, they can use it to [tackle more] complex questions.[87] "This gives them a sense of discovery and [excites them] to learn more about how behavior works."[88] Outside the classroom, PORTL is a valuable resource for conducting basic research with human participants in research and clinical settings.[89]

- **Open Access Data Analysis**: Data literacy is an essential skill set for the twenty-first century.[90] Educators can help students explore psychological themes and develop transferable analytical skills by having them analyze open data sets through visualization and statistical inference. For instance, traffic violation records can be used to study repeated offense behaviors, while reward program participation records can help examine compulsive buying disorder.[91] Numerous open-access repositories allow educators to access diverse data on various psychology topics, enabling them to design unique activities with real-world relevance.[92]
- **Field studies**: Traditional laboratory studies often fail to capture the full extent of animal cognitive processes, which have evolved in natural settings. To understand these processes, we must examine them in the context of the animals' natural environments.[93] Harm-free field studies outside a controlled laboratory setting require a research plan at the outset.[94] Designing a field research strategy compels students to review the existing work in a given field, form testable hypotheses, decide which data type to collect, and select relevant statistical tests. This approach to teaching psychology is comparable in its value to traditional classroom methods. For instance, students observing wild pigeons in a city park received evaluation scores similar to those of students who studied operant conditioning using rats in a traditional laboratory.[95] In addition, having students in psychology-of-learning courses work with animals in an animal shelter offers many benefits that are not available in classroom animal laboratories. These include applying science in everyday situations and providing

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[86] Hunter M, Rosales-Ruiz J. What is PORTL? Behavior Explorer. Published 2019. Accessed November 3, 2025. https://behaviorexplorer.com/articles/portl-intro/.
[87] *Ibid.*
[88] *Ibid.*
[89] Goodhue et al. 2019.
[90] Coughlan T. The use of open data as a material for learning. *Education Tech Research Dev.* 2020; 68, 383–411.
[91] Cornell D. 13 Operant Conditioning Examples. Helpful Professor. May 13, 2023. Accessed November 3, 2025. https://helpfulprofessor.com/operant-conditioning-examples/.
[92] PsychArchives. *(n.d.).* Disciplinary Repository for Psychological Science. Accessed November 3, 2025. https://psycharchives.org/.
[93] Pritchard DJ, Hurly TA, Tello-Ramos MC, Healy SD. Why study cognition in the wild (and how to test it)? *J Exp Anal Behav.* 2016: 105(1), 41-55. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/26781051/.
[94] Sueur C, Zanaz S, Pelé M. Incorporating animal agency into research design could improve behavioral and neuroscience research. J Comp Psychol. 2023;137(2), 129-143. Accessed November 3, 2025. https://pubmed.ncbi.nlm.nih.gov/37104768/.
[95] Cohen PS, Block M. Replacement of laboratory animals in an introductory-level psychology laboratory. *Hum Innov Altern*. 1991; 5, 221-225. Accessed November 3, 2025. https://www.interniche.org/et/studies/replacement-laboratory-animals-introductory-psychology-laboratory.

valuable community service (e.g., stress alleviation and sociability training in companion animals and rehabilitated wildlife).[96,97,98]

Request for Modernizing Psychology Curriculum

There is no legal, scientific, or ethical justification to harm animals to prepare students for careers in brain science. It is also critical that young psychologists and neuroscientists discuss the problems associated with animal use in education and are given a plethora of nonanimal tools. Otherwise, we risk fostering a "culture of disengagement" regarding public welfare issues[99] or alienating talented and compassionate people from the field.

We request that USU prioritize the replacement of the use of animals in PSY 3400 with effective, non-animal teaching methods, which are the best-practice standard used at other universities. We also ask that USU adopt a public policy on its psychology department's website prohibiting the use of animals in undergraduate psychology curricula. Our suggested public policy language is: *"The psychology program at Utah State University does not use animals for educational purposes and instead uses nonanimal methods for curricular laboratories."*

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[96] Flaisher-Grinberg S. For the love of dogs: An academia-community partnership targeting a mutual goal. *J Center Interdiscip Teach Learn*. 2021: 9(1), 8-15. Accessed November 3, 2025. https://d-scholarship.pitt.edu/44363/1/Rescued%20is%20My%20Favorite%20Breed.pdf.

[97] McDonald TW, Caso R, Fugit D. Teaching and learning operant principles in animal shelters: Perspectives from faculty, students, and shelter staff. *J Instr Psychol*. 2005: 32(4), 310-321. Accessed November 3, 2025. https://scholarworks.boisestate.edu/commhealth_facpubs/10/.

[98] Back to Shool Operant Conditioning with Tigers. *(n.d.).* Carolina Tiger Rescue. Accessed November 3, 2025. https://carolinatigerrescue.org/newsroom/back-to-school/.

[99] Cech EA. Culture of Disengagement in Engineering Education? *Sci Technol Human Values*. 2014: 39(1): 42–72. Accessed November 3, 2025. doi:10.1177/0162243913504305.