

## Alien Intelligence Research Institute: a Perspective-Taking Activity for a Nuanced View on Traits and a Growth Mindset

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### INTRODUCTION

Multiple strategies can be used to help create inclusive learning environments. In the biology classroom, introducing intelligence as a malleable biological trait can support both the learning of content as well as inclusivity. To help students develop an accurate understanding of traits the curriculum can present a view of variation in traits, including learning and intelligence, as being the result of a combination of multiple genetic and environmental influences (1, 2). This approach can lead away from the genetic determinism or essentialism that can be inadvertently communicated in the teaching of biology, and that has been linked to an increase in racial bias (3).

By framing intelligence and learning as malleable, the Alien Intelligence Research Institute activity supports a more accurate view of traits and fosters an understanding of learning as a growth process. Promoting a growth learning mindset has been shown to increase students' sense of belonging, academic performance, and health, especially for students who experience stereotype threat (4–6). Further, for the activity students collaborate in groups to come to their understanding of the complexity of intelligence. The collaborative aspect of the activity is grounded in findings that engaging in cross-group interactions with diverse others can further support a sense of belonging for students who experience stereotype threat (7, 8).

The activity also provides an opportunity for instructors to communicate that they value growth, empathy, and diversity. An instructor's fixed mindset has been associated with racial achievement gaps (9), and through the activity, instructors express the view of intelligence as malleable. The activity engages students in perspective-taking from the point of view of an alien scientist team who visits Earth. The

perspective-taking aspect allows the instructor to show that there is value to different abilities and aspects of intelligence, as well as to an empathic consideration of a diversity of perspectives. Communicating explicitly that diversity is valued is another strategy that can lessen stereotype threat and promote inclusivity (10). Perspective-taking can be particularly beneficial as it engages empathy and has been used to reduce racial bias (11).

The student learning goals for the Alien Intelligence Research Institute activity were designed using the Significant Learning framework (12) (for a practical reference, see <https://www.buffalo.edu/catt/develop/design/learning-outcomes/finks.html>). The activity expands on the conventional way of teaching biology content by presenting explicitly a wider view of traits and linking traits to learning and intelligence. The goal is to encourage students, through creativity and play, to think more deeply about traits and connect their understanding to personal and societal issues. The student learning goals for the activity are as follows: (i) identify traits linked to learning and intelligence, (ii) describe the malleability of traits, including those linked to intelligence, (iii) connect the biological understanding of traits with societal issues around intelligence, (iv) explore the complexities of traits linked to intelligence, and (v) gain an appreciation of the diversity of intelligence by imagining intelligence from the perspective of another life form and developing a research plan to study intelligence.

### PROCEDURES

The activity was implemented as part of a start-of-semester unit on human diversity and race in an introductory biology course at a midsize public university with a minority-serving designation. The course is one of two introductory biology courses for biology, prehealth, and science, technology, engineering, and mathematics (STEM) majors. The topics covered are evolution, physiology, and ecology. The activity was implemented as part of a synchronous, online format during the coronavirus disease 2019 (COVID-19) pandemic in Spring 2021. The course uses team-based learning (13, 14) and students

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## BOX 1

## Alien Intelligence Research Institute activity prompt

Team Task: You are on a team of alien scientists sent to Planet Earth to figure out what kinds of intelligence(s) an intriguing species calling themselves *Homo sapiens* has. What kinds of tests could you do with your team to figure out how *H. sapiens* intelligence(s) manifest?

Think outside the box! Remember, your aliens can have whatever kinds of abilities, motivations, and intelligence that you want them to have! Here are some suggestions that can help you think outside the box, including from the point of view of animals that may be different from you:

- What if the alien is great at . . . [whatever ability you choose]
- How would a dog/cat/ant/bat/dolphin/bird/etc. test your intelligence?!
- Think, what can a dog/cat/ant/bat/dolphin/bird/etc. do that people cannot???
- What would you do to improve your cognitive ability? How would you test that it has, indeed, improved?
- Remember that learning and knowledge are closely linked to understanding intelligence

worked in groups (in Zoom breakout rooms) from the first class, though permanent teams were not assigned until after the activity. Undergraduate learning assistants who have taken the course before and are simultaneously taking a pedagogy class for learning assistants assisted in the breakout rooms.

The first two class periods introduce the course, the growth learning mindset, human diversity, and the benefits of diversity in teamwork and scientific pursuits. In the homework assignment for the third class period students read, summarize, and reflect on the chapter “Cognitive ripples” from Frans De Waal’s book “Are we smart enough to know how smart animals are” (15); (Text S1). In class, students are first introduced to the fundamentals of traits for about half an hour as part of an interactive lecture (Text S1). Then, student groups work in breakout rooms for about half an hour to create a slide in a shared file describing an “alien intelligence research plan” to test for human intelligence from the perspective of an alien life form (Box 1; Text S1 provides examples of student work).

For the activity, students have the freedom to choose their alien to have whatever abilities, motivations, and intelligence they wanted. By considering the diversity of abilities that different animals on Earth, students explored how intelligence can take many forms. Through the activity students also demonstrate that the understanding of intelligence is closely linked to the methods of study as well as the physical abilities and values of the experimenter. Some students also incorporated elements of rigorous experimental design, as well as fictional results of how *Homo sapiens* performed on the tests, though this was not prompted in the instructions or required. However, the activity can be used as an engaging warm-up activity for experimental design; many introductory biology courses teach scientific methods at the start of the semester.

Students had more fully developed work when the activity was done in the publicly visible Google slides mode in Spring 2021, compared to the previous semester when students posted their groups’ ideas on the course discussion board. Even though they could see each other’s work in the Spring 2021 semester, each team took their own approach. Overall, using publicly accessible presentation slides seem to improve

the quality of the work, perhaps through increased accountability as well as improved clarity of the goals of the task. The most common question was “Are we the aliens?”. I recommend keeping the perspective of alien researching humans, rather than the other way around, as this is precisely what asks students to step outside the human perspective and to challenge assumptions.

## CONCLUSIONS

The Alien Intelligence Research Institute activity demonstrates an approach that grew out of the COVID-19-era synchronous online teaching format that applies to different course delivery formats. It can be used to support the learning of fundamental biology content together with promoting a growth mindset and a sense of belonging, as well as collaborative learning.

The activity can be incorporated in any biology class, including when implemented at the start of class to set the tone for inclusive work for the rest of the semester. The activity is complementary to efforts to promote a growth mindset that many instructors already use. Because it is easy and fun for students to contribute, regardless of prior knowledge, it can be used as a team-building exercise in collaborative classrooms.

Through the link with fundamental biology content on traits and genetics, the Alien Intelligence Research Institute activity can be used to support the learning of content in a way that is relevant to students’ lives. Therefore, it can also be used during the semester at a content-appropriate time that can serve to reinvigorate student enthusiasm (in my course, it was rated as the most fun of all the weekly activities) and to reinforce the instructor’s commitment to diversity and inclusion.

While my course employs active learning assistants, the activity can be used in courses that do not have such assistants. This is largely because students can do it on their own without prior knowledge when given clear instruction. While in my course students were primed via a chapter on how human scientists study nonhuman animal intelligence,

the activity can likely be used without prior homework reading. An alternative format (including for asynchronous online courses) would be to adapt it as an out-of-class group assignment. Another alternative would be to use it as a springboard for a deeper discussion on intelligence, for example as part of neurobiology, psychology, scientific ethics, or “science and society” courses.

## SUPPLEMENTAL MATERIAL

Supplemental material is available online only.

**SUPPLEMENTAL FILE 1**, PDF file, 1.8 MB.

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