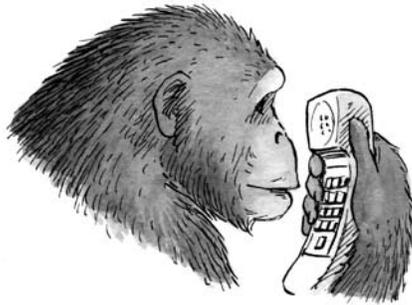


Ape Genius

PROGRAM OVERVIEW

Note: This program includes a short scene where bonobos are shown engaging in mating and social bonding activities. Please preview the program to determine its appropriateness for your classroom.



NOVA explores evidence for intelligence and culture among the apes and ponders the question about what differences exist between apes and humans.

The program:

- presents field observations of apes in Senegal, Africa, who have been seen hunting for small primates (called bush babies) with spears they have made from tree branches.
- reports on experiments designed to understand more about the mechanical aptitude of apes.
- reveals the surprising discovery that chimpanzees—who were thought to fear water—were seen cooling off in a tiny pond.
- explores the ways that apes master imitation, a skill considered core to the development of human culture.
- reviews Jane Goodall's research that revealed the ability of chimpanzees to craft tools made for a specific purpose and contributed to the idea that chimpanzees have emotional lives as exhibited through behaviors such as mother-baby bonding.
- presents experiments that seek to discover whether, and to what extent, apes can cooperate.
- details studies that investigate both the positive and negative social emotions of apes.
- surveys research done to better understand the abilities of apes to do math and communicate with humans.
- provides reasons why, even though apes exhibit a number of behaviors that suggest that they have some degree of culture, they fall far short of what humans achieve.

Taping rights: Can be used up to one year after program is recorded off the air.

BEFORE WATCHING

- 1 Ask your students to describe how the non-human great apes—which include chimpanzees, bonobos, gorillas, and orangutans—are usually portrayed on TV or in movies. Do they think that the media portray the great apes realistically? Why or why not? Have students provide a list of things they think apes can learn, what kinds of things apes can teach each other, and ways that apes cooperate. Ask students to give examples to support their answers.
- 2 As students watch, assign groups to collect information using the viewing guide provided in the activity called “The Intelligence Gap?” on page 2. See the activity procedure section for instructions.

AFTER WATCHING

- 1 After students have watched the program, have them revisit their lists about what they thought apes could do. How many of their preconceptions were correct? What did they learn about what apes can teach and learn, and how they cooperate? What facts about ape intelligence were most surprising to students? Why?
- 2 Tell students that they have been awarded a grant to contribute a study to this line of research with apes. Organize students into groups and have each group consider additional experiments they could design to assess intelligence in apes. Help students to formulate ideas by asking them what signs of intelligence they would look for. Have each group create a protocol for its study that includes details about which apes would be studied, under what conditions, for how long, and in what environment.

CLASSROOM ACTIVITY

Activity Summary

Students use a viewing guide while watching a program about the science of ape intelligence and, after watching, discuss answers to questions related to similarities and differences between intelligence in apes and in humans.

Materials for Each Team

- copy of “Ape Genius?” student handout
- copy of “Studying Apes and Humans” student handout
- pencil or pen

Background

One of the ongoing discussions in behavioral research is about whether the non-human great apes (chimps, bonobos, orangutans, and gorillas) are as intelligent as human beings. Intelligence refers to the ability to learn, reason, plan, think abstractly, comprehend ideas, and solve problems. It involves the ability to understand and profit from experience and to apply that knowledge to cope with, interact with, and manipulate the outside world.

A number of experiments and field research projects have been conducted to assess ape intelligence. These studies look at key skills and behaviors that are associated with intelligence in humans. Key factors include:

- mechanical aptitude (Do apes make and use tools? Can apes manipulate items in their environment for a purpose?)
- imitation (Do apes learn by copying?)
- cooperation (Will apes cooperate to maximize self-interest?)
- social emotions (Can apes understand responsibility and intent? Do they exhibit impulse control? Can they empathize?)
- math and communication skills (Do apes demonstrate an understanding of symbols and numbers? Can they communicate ideas either verbally or nonverbally? Do they engage in an exchange of ideas and information?)
- comprehension (Can apes comprehend abstract ideas? Are they able to apply previous knowledge to new situations?)

LEARNING OBJECTIVES

Students will be able to:

- discuss different ape and human behaviors and how they are related to intelligence.
- describe experiments that scientists use to assess ape intelligence.
- compare and contrast intelligence in apes and humans.

STANDARDS CONNECTION

The “Ape Genius?” activity aligns with the following National Science Education Standards (see books.nap.edu/html/nses).

GRADES 9–12

Life Science

- Biological evolution
- The behavior of organisms

History and Nature of Science

- Nature of scientific knowledge

CLASSROOM ACTIVITY (CONT.)

Procedure

- 1 Organize students into teams. Assign each team to track experiments and field observations in one of the following categories:
 - A Mechanical Aptitude
 - B Imitation
 - C Cooperation
 - D Social Emotions
 - E Math/Symbol Skills
 - F Communication
- 2 Distribute a copy of the student handouts to each team before viewing.
- 3 Show the program and have students individually take notes on the topic their team has been assigned.
- 4 After watching the program, have students meet in their teams to discuss their notes. Ask teams to come to consensus on the observations made in each experiment and the conclusions drawn based on those observations.
- 5 Use the following questions to have a class discussion about what researchers inferred about the experimental results and observations in regard to what the similarities and differences are between apes and humans:
 - What examples indicate that apes can manipulate items in their environment for a purpose? *(Some examples included chimps making spears and apes finding ways to get food that would otherwise have been inaccessible.)*
 - How is imitation similar and different in apes and in humans? *(Both apes and humans will imitate processes they see others of their own kind doing. Humans will copy other humans verbatim even if it includes unnecessary actions, while apes will not.)*
 - How is cooperation similar and different in apes and in humans? *(In general, apes do not cooperate well—with the exception of the bonobos—because they tend to let emotions such as rivalry and lack of impulse control impede cooperation. Humans cooperate more extensively.)*
 - How is communication similar and different in apes and in humans? *(Like humans, apes can communicate their wants or respond to direct commands or questions. Unlike humans, apes seem to lack an “intent to communicate,” that is, there is no direct sharing of such things as thoughts, questions, and ideas.)*
 - What evidence supports the concept that chimps exhibit signs of intelligence similar to that of humans? *(Apes exhibit the ability to imitate, to determine intent, to use symbols, to display positive social emotions, to cooperate, and to problem-solve.)*

CLASSROOM ACTIVITY (CONT.)

- What are some abilities that humans have that set them apart from apes? (*Humans are better able to control their emotions, they have a more powerful ability to infer what others are thinking, and they are invested in teaching and learning, which allows the continued transfer of knowledge to future generations.*)
- 6 To conclude, ask students to consider the conclusions drawn by the researchers. Which experiments or field observations and conclusions did students think were most valid? Why? Which did students think were least valid? Why? (*Students may be more confident in experiments that were done many times or with many subjects, or field observations that were done over a long period of time or by a number different research groups. They may be less confident about an experiment done with one individual or with a researcher who may appear to have a research bias with his or her subjects.*)
 - 7 As an extension, have students generate questions they have about ape intelligence. Group together students who have related questions. Have teams research and answer their own questions and present their findings to the class.

Classroom Activity Author

Margy Kuntz has written and edited educational materials for more than 20 years. She has authored numerous educational supplements, basal text materials, and trade books on science, math, and computers.

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LINKS AND BOOKS

Links

NOVA—Ape Genius

www.pbs.org/nova/apegenius

Features articles, interviews, interactive activities, and resources to accompany the program.

Chimpanzee Central— The Jane Goodall Institute's Chimpanzee Resource

www.janegoodall.org/chimp_central/default.asp

Includes information about chimpanzees' habitat, physical characteristics, social organization, and communication.

Living Links

www.emory.edu/living_links

Provides information about current research on primates, an audio and video library, academic publications, and more.

Primate Info Net: About the Primates

pin.primat.wisc.edu/aboutp/

Includes an extensive series of fact sheets about the different primate species, which cover morphology, ecology, behavior, and conservation along with range maps, images, and a glossary of terms. Also includes resources on evolution, myths and legends, diseases, and taxonomy.

Think Tank

nationalzoo.si.edu/Animals/ThinkTank/default.cfm

Examines the question "What is thinking?" as it relates to the great apes. Includes detailed articles about the science behind the exhibit as well as a photo gallery.

Books

The Great Apes: Our Next of Kin

by Michelle A. Gilders.

Greystone Books, 2000.

Presents information on the different great apes' habitats, members,

behavior, and mating habits, along with anecdotes of the animals' depiction in literature, myths about members of the species, and tales of famous animals.

The Great Apes: Our Face in Nature's Mirror

by Michael Leach.

Sterling Publishing, 1998.

Provides an introduction to the great apes that includes comparisons of human and ape behavioral and cultural adaptations.

Reaching into Thought:

The Minds of the Great Apes

by Anne E. Russon, Kim A. Bard, and Sue Taylor Parker, editors.

Cambridge University Press, 1999.

Investigates the qualities that set the intelligence of chimpanzees, bonobos, gorillas, and orangutans apart from that of other non-human primates and humans.

ACTIVITY ANSWER

The following chart lists some of the observations made and conclusions drawn in the experiments shown in the program.

Team	Experiment/Field Observation	Research Question(s)	Subject	Observations	Conclusions
A Mechanical Aptitude	chimpanzees in Fongoli, Senegal	Is ape making tool?	chimps	chimps broke off branch, sharpened with teeth	apes are demonstrating mechanical aptitude
	peanut placed in clear tube	Can ape get peanut?	chimps	ape did nothing for 10 minutes then suddenly used water as a tool	apes are demonstrating mechanical aptitude
B Imitation	grape in slot machine	Can apes from the same troop learn from another ape? From watching an ape from a rival group?	chimps	apes learned easily from same and rival troops	apes can learn by observation
	treat in opaque puzzle box, then in see-through box	Will ape and human copy actions to get treat?	chimps/humans	chimp and humans copied well on first box; on see-through box, chimps realized first step was unnecessary; humans did not	kids may imitate adults because they believe adults are performing the actions for a good reason
C Cooperation	food hidden under heavy stone	Can apes cooperate with apes, or with humans, to get food?	chimps	chimps did not cooperate with each other but eventually did with humans	maybe chimps knew humans wouldn't compete for food
	food is placed on tray with rope attached to pull it in	Can apes cooperate to get food?	chimps	chimp went to get help	cooperation is the exception; teamwork doesn't come naturally to chimps
	food placed in central box	Will apes cooperate and split food?	bonobos	bonobos cooperated	more congenial temperaments make bonobos more inclined to cooperate

chart continued on following page

ACTIVITY ANSWER (CONT.)

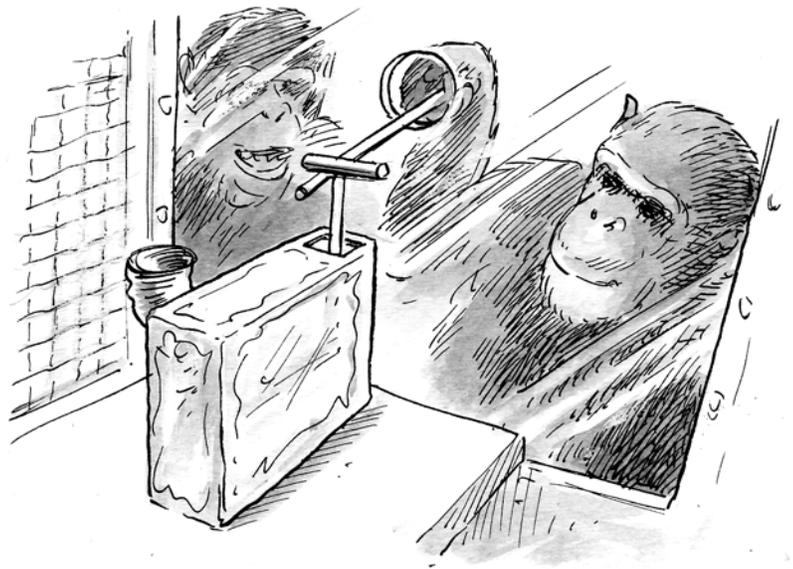
Team	Experiment/Field Observation	Research Question(s)	Subject	Observations	Conclusions
D Social Emotions	treats dispensed on table; rope can be pulled to end experiment	Will ape choose to end experiment?	chimps	chimp ended experiment when ape stole food but not when human moved food away	chimps can gauge who is responsible for something done; can determine intentions
	young ape dies	Will apes help others despite big risk?	bonobos	chimps mounted defense of dead bonobo	bonobos will help another at risk to themselves
	candy is placed in two dishes	Which dish will ape choose?	chimps	chimp always chose dish with more candy	chimps did not exhibit impulse control
	candy placed in two dishes	Will children wait to get more candy?	humans	some children were patient; others were not	children with impulse control exhibited higher SAT scores
E Math/ Symbol Skills	numerals displayed on screen	Could chimp count?	chimps	chimp performed several tasks with the numbers	learned numbers very differently from humans
	symbols are placed in two dishes	Which dish will ape choose?	chimps	chimps pointed to smaller numeral to get bigger prize	symbols can help distance ape from impulses
	bonobos follows verbal instructions	Can apes communicate?	bonobos	bonobo performed a number of requested tasks	shows ability to communicate but does not use language like human
F Communication	treat under a cup	Will child or chimp know where treat is if pointed to?	humans/ bonobos	child could find treat; chimp could not	maybe natural selection allowed humans to use cooperative tools in ways other species do not
	child and parent watching puppet show	Will child understand what pointing means?	humans	children understood that pointing meant to pay attention to another object	mother and babies pay full attention to each other with shared goal and commitment
	ball moved from one bag to another	Will child be able to infer when someone else will or will not know the ball has been moved?	chimps/ humans	three-year-old did not know what others knew; four-year-olds did	humans could know what someone else thinking
	experimenter shows he wants to steal food	Will chimp take into account what the researcher knows?	chimps	chimp stole food from place chimp thought experimenter could not see	chimps exhibit some ability to determine what others know

Ape Genius?

The non-human great apes—chimps, bonobos, orangutans, and gorillas—are our nearest relatives. They have some of the biggest brains in proportion to body size of any animals and their capacity for intelligence seems to be unsurpassed by other species except our own. But are apes as intelligent as humans? In this activity, learn what studies reveal about the intelligence of great apes.

Procedure

- 1 Circle which of the following category you were assigned on your “Studying Apes and Humans” handout:
 - A Mechanical Aptitude
 - B Imitation
 - C Cooperation
 - D Social Emotions
 - E Math/Symbol Skills
 - F Communication
- 2 Read about what the experiments or field observations in your category entail on the handout.
- 3 While watching the program, take notes on:
 - what was observed in the experiments about apes and humans
 - what conclusions were drawn from the observations
- 4 After watching the program, meet with your team members. Together, come up with a team consensus about what was observed and concluded. Write these answers down on a new sheet of paper.



Studying Apes and Humans

Team Assignment	Experiment/Field Observation	Research Question(s)	Subject
A Mechanical Aptitude	chimpanzees in Fongoli, Senegal	Is ape making tool?	chimps
	peanut placed in clear tube	Can ape get peanut?	chimps
B Imitation	grape in slot machine	Can apes from the same troop learn from another ape? From watching an ape from a rival group?	chimps
	treat in opaque puzzle box, then in see-through box	Will ape and human copy actions to get treat?	chimps/humans
C Cooperation	food hidden under heavy stone	Can apes cooperate with apes, or with humans, to get food?	chimps
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	food placed in central box	Will apes cooperate and split food?	bonobos
D Social Emotions	treats dispensed on table; rope can be pulled to end experiment	Will ape choose to end experiment?	chimps
	young ape dies	Will apes help others despite big risk?	bonobos
	candy is placed in two dishes	Which dish will ape choose?	chimps
	candy placed in two dishes	Will children wait to get more candy?	humans
E Math/Symbol Skills	numerals displayed on screen	Could chimp count?	chimps
	symbols are placed in two dishes	Which dish will ape choose?	chimps
	bonobos follow verbal instructions	Can apes communicate?	bonobos
F Communication	treat under a cup	Will child or chimp know where treat is if pointed to?	humans/ bonobos
	child and parent watching puppet show	Will child understand what pointing means?	humans
	ball moved from one bag to another	Will child be able to infer when someone else will or will not know the ball has been moved?	chimps/humans
	experimenter shows he wants to steal food	Will chimp take into account what the researcher knows?	chimps