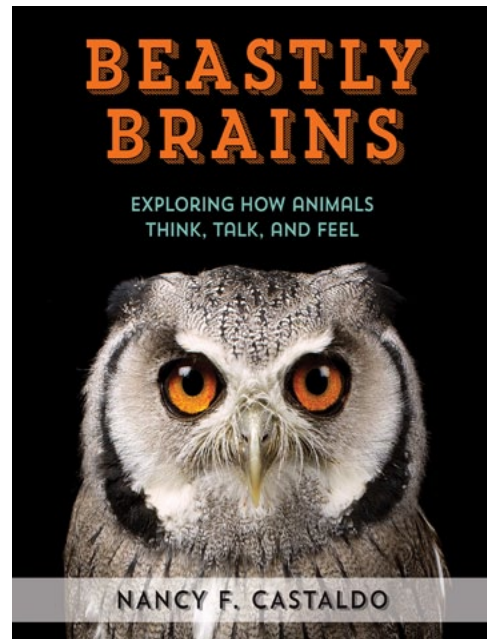


A Common Core State
Standards and
Next Generation Science
Standards Aligned
Educator's Guide
for
Grades 7 to 12



BEASTLY BRAINS: EXPLORING HOW ANIMALS THINK AND FEEL

ISBN: 9780544633353

Written by Nancy F. Castaldo

Published by Houghton Mifflin Harcourt

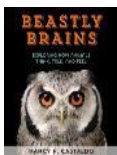
In this fascinating nonfiction account, author Nancy F. Castaldo reveals just what's going on inside the minds of animals, and through understanding animal intelligence we discover more about ourselves, including far more similarities than one might expect. Humans may have the biggest brains, but intelligence is not a quality exclusive to only us!

Guide created by Debbie Gonzales
www.debbiegonzales.com



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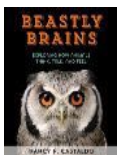
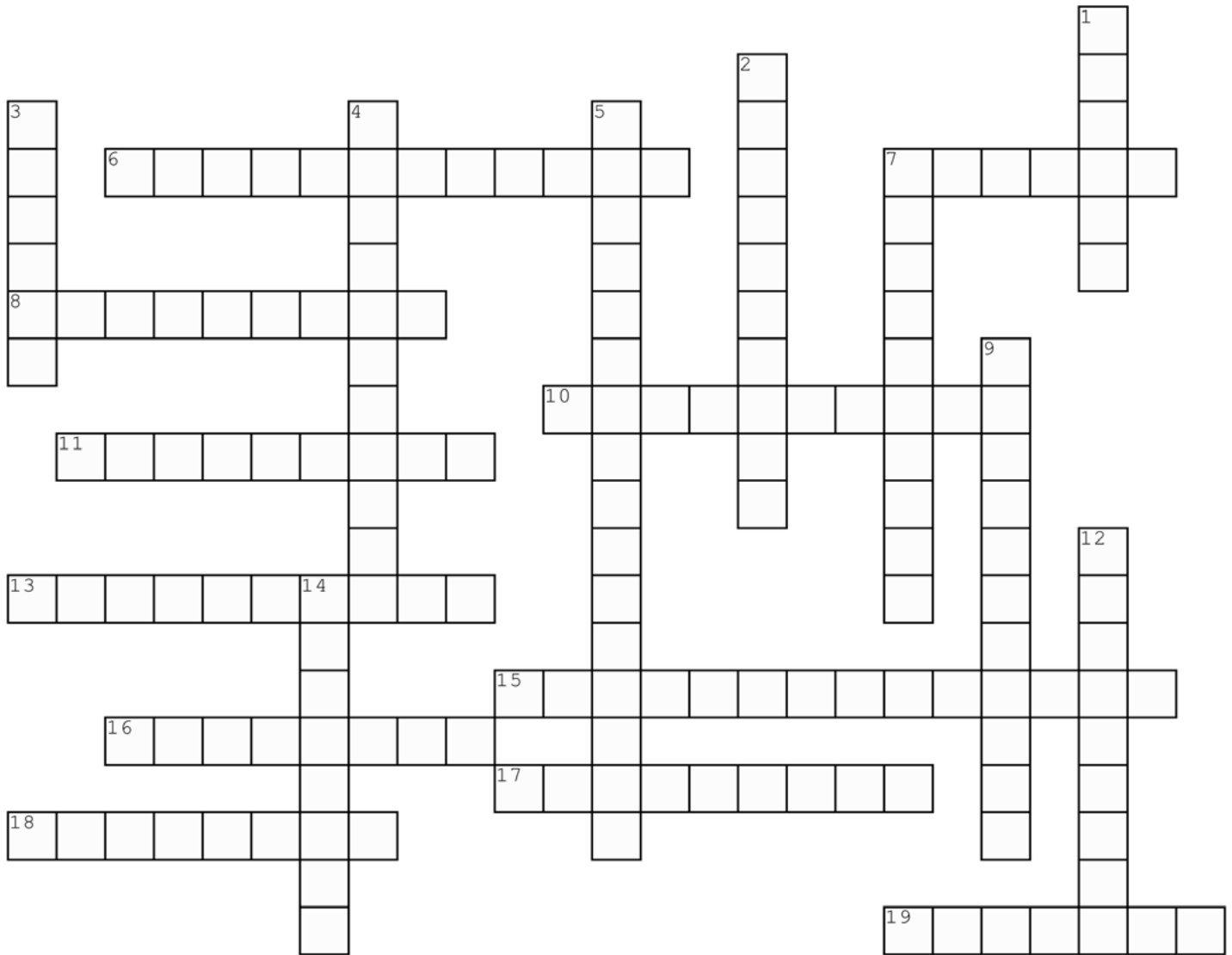
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BEASTLY BRAINS CROSSWORD PUZZLE

INSTRUCTIONS: Refer to pages 1 through 47 in solving the crossword puzzle below. On the following page, cite the page numbers from the text on which terms are referenced in the space provided. Crossword puzzle answers and text references can be found on the pages 5 and 6 of this guide.



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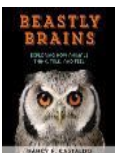
BEASTLY BRAINS CROSSWORD PUZZLE CLUES

ACROSS:

6. Learning process established by shaping behavior *cite pg.*_____
7. Communicate with slight movements of their ears *cite pg.*_____
8. Refers to an animal's world as it is perceived and internalized *cite pg.*_____
10. Animal with the largest brain *cite pg.*_____
11. Documentary focusing on the harsh treatment of oca whales *cite pg.*_____
13. A potential answer to a scientific question *cite pg.*_____
15. The greater number of folds in this part of the brain, the more intelligent the animal *cite pg.*_____
16. Rhesus macaques are a species of monkeys classified as being _____ monkeys *cite pg.*_____
17. Scientist who believed that humans' use of language is what sets us apart from animals *cite pg.*_____
18. Scientist who believed that animals have minds *cite pg.*_____
19. Psychologist who believed that animal actions can be attributed to behavior or instinct *cite pg.*_____

DOWN:

1. Describes the world surrounding the animal *cite pg.*_____
2. Animal with the smallest brain *cite pg.*_____
3. Scientist who concluded that instinct leads worms to seal their burrows *cite pg.*_____
4. Scientists who study instinct *cite pg.*_____
5. Putting human sensibilities at the center of analysis *cite pg.*_____
7. Compared individual ants acting within a community to neurons in the brain *cite pg.*_____
9. Ecologist who believed that behavior is caused by external events and stimuli *cite pg.*_____
12. Decision-making process through the use of a collective consensus *cite pg.*_____
14. A catalog of observed behaviors *cite pg.*_____

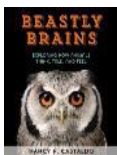
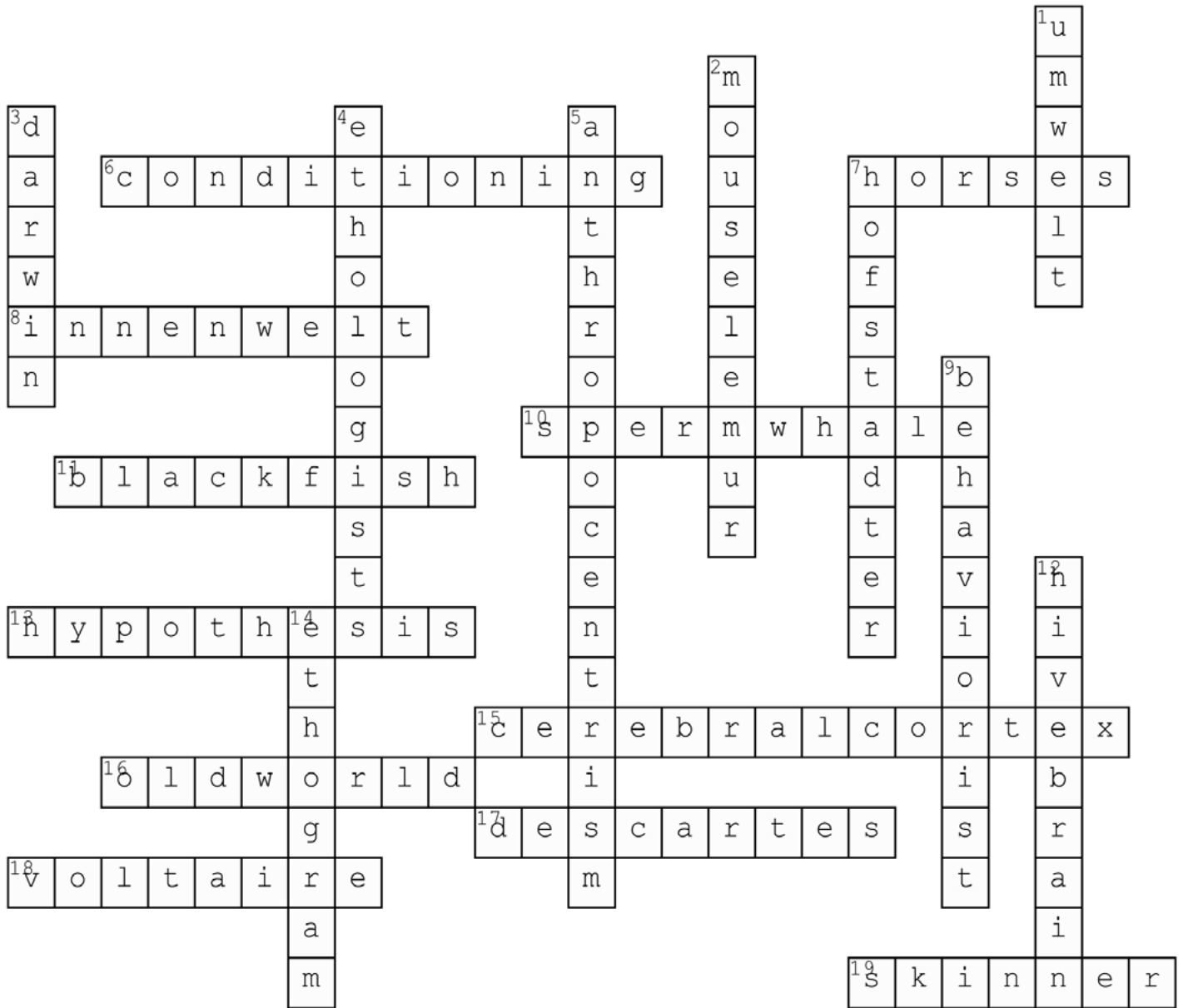


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BEASTLY BRAINS CROSSWORD PUZZLE ANSWERS



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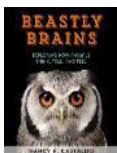
BEASTLY BRAINS CROSSWORD PUZZLE CITATION ANSWERS

ACROSS:

6. Learning process established by shaping behavior *cite pg.* 10
7. Communicate with slight movements of their ears *cite pg.* 21
8. Refers to an animal's world as it is perceived and internalized *cite pg.* 29
10. Animal with the largest brain *cite pg.* 1
11. Documentary focusing on the harsh treatment of oca whales *cite pg.* 16
13. A potential answer to a scientific question *cite pg.* 23
15. The greater number of folds in this part of the brain, the more intelligent the animal *cite pg.* 2
16. Rhesus macaques are a species of monkeys classified as being _____ monkeys *cite pg.* 35
17. Scientist who believed that humans' use of language is what sets us apart from animals *cite pg.* 9
18. Scientist who believed that animals have minds *cite pg.* 9
19. Psychologist who believed that animal actions can be attributed to behavior or instinct *cite pg.* 11

DOWN:

1. Describes the world surrounding the animal *cite pg.* 29
2. Animal with the smallest brain *cite pg.* 1
3. Scientist who concluded that instinct leads worms to seal their burrows *cite pg.* 6
4. Scientists who study instinct *cite pg.* 12
5. Putting human sensibilities at the center of analysis *cite pg.* 27
7. Compared individual ants acting within a community to neurons in the brain *cite pg.* 46
9. Ecologist who believed that behavior is caused by external events and stimuli *cite pg.* 12
12. Decision-making process through the use of a collective consensus *cite pg.* 45
14. A catalog of observed behaviors *cite pg.* 23



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Memes: Writing Prompts

INSTRUCTIONS: Respond to one or all of the quotes below by writing an informative or explanatory essay using citations from the text in support of your claims.

“You cannot share your life with any animal with a well-developed brain and not realize that animals have personalities.”
-Jane Goodall

“For a scientist, knowing the questions to ask is as important as finding the answers.”

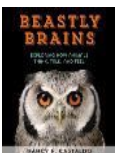
-Dr. Diana Reiss

“A question answered usually raises new problems, and it would be presumptuous to assume that an end is ever achieved.”

-Dr. Karl von Frisch

“Honeybee swarms and complex brains show many parallels in how they make decisions.”

-Dr. Thomas Seeley



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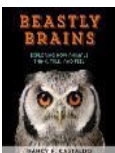
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BEASTLY BRAINS ACROSTIC PUZZLE

INSTRUCTIONS: Refer to pages 48 through 95 in solving the puzzle below. On the following page, cite the page numbers from the text on which terms are referenced in the space provided. Acrostic puzzle answers and text references can be found on the pages 10 and 11 of this guide.

1.	_____	B	_____
	2.	E	_____
3.	_____	A	_____
	4.	S	_____
5.	_____	T	_____
	6.	L	_____
7.	_____	Y	_____
	8.	B	_____
	9.	R	_____
10.	_____	A	_____
	11.	I	_____
12.	_____	N	_____
	12.	S	_____



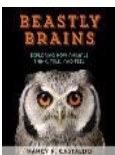
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BEASTLY BRAINS ACROSTIC PUZZLE CLUES

1. Asian elephant use their trunks and teeth to gather and eat lots of plants, including leaves, bark, grasses, and crops. Elephants are plant-eaters, also known as _____ . *cite pg.*_____
2. Dolphins have the ability to differentiate themselves from others. They know the concepts of “ _____ ” and others. *cite pg.*_____
3. Kanzi the bonobo demonstrated the ability to use these symbols to communicate with humans. *cite pg.*_____
4. An iPad program developed to give orangutans acces to music, instruments, cognitve games, art, and video. *cite pg.*_____
5. Scientific reference to the dislike of not being treated fairly. *cite pg.*_____
6. Dolphins respond to their reflections in the mirror by opening their mouths widely and wiggling their tongues. These behaviors indicate _____ . *cite pg.*_____
7. The ability to recognize that someone might desire or perceive some particular emotional or physical response. *cite pg.*_____
8. Name of the orangutan who chooses to walk on two feet, like her human researchers. *cite pg.*_____
9. Type of animal who was trained to use sign language to communicate. *cite pg.*_____
10. An expression of kindness toward others. *cite pg.*_____
11. If an animal feels distress when observing the same emotion in another animal, they are expressing an _____ . *cite pg.*_____
12. Monkeys have been known to _____ grapes when researchers are not paying attention. *cite pg.*_____

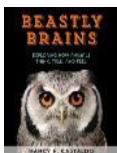


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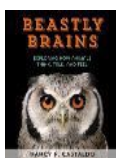


BEASTLY BRAINS ACROSTIC PUZZLE ANSWERS

1. H E R **B** I V O R E S2. S **E** L F3. L E X I G **R** **A** M S4. A P P **S** 4 A P E S5. I N E Q U **I** **T** Y A V E R S I O N6. S E **L** F A W A R E N E S S7. T H E O R **Y** O F M I N D8. B O N N I E9. G O **R** I L L A10. E M **P** **A** T H Y11. W H **I** S T L E S12. E M O T I O **N** A L C O N T A G I O N12. S T E A L

BEASTLY BRAINS ACROSTIC PUZZLE CITATIONS

1. Asian elephant use their trunks and teeth to gather and eat lots of plants, including leaves, bark, grasses, and crops. Elephants are plant-eaters, also known as _____ . *cite pg.* 94
2. Dolphins have the ability to differentiate themselves from others. They know the concepts of “_____” and others. *cite pg.* 90
3. Kanzi the bonobo demonstrated the ability to use these symbols to communicate with humans. *cite pg.* 77
4. An iPad program developed to give orangutans acces to music, instruments, cognitive games, art, and video. *cite pg.* 83-84
5. Scientific reference to the dislike of not being treated fairly. *cite pg.* 61
6. Dolphins respond to their reflections in the mirror by opening their mouths widely and wiggling their tongues. These behaviors indicate _____ . *cite pg.* 90
7. The ability to recognize that someone might desire or perceive some particular emotional or physical response. *cite pg.* 48
8. Name of the orangutan who chooses to walk on two feet, like her human researchers. *cite pg.* 84
9. Type of animal who was trained to use sign language to communicate. *cite pg.* 74
10. An expression of kindness toward others. *cite pg.* 55
11. If an animal feels distress when observing the same emotion in another animal, they are expressing an _____ . *cite pg.* 56
12. Monkeys have been known to _____ grapes when researchers are not paying attention. *cite pg.* 51



Memes: Writing Prompts

INSTRUCTIONS: Respond to one or all of the quotes below by writing an informative or explanatory essay using citations from the text in support of your claims.

“I am not even particularly interested in demonstrating animal empathy, because for me the critical issue is no longer whether they have it, but how it works.”

- Dr. Frans de Waal

“For me, the most important find is that like us, chimpanzees take into account the needs and wishes of others”

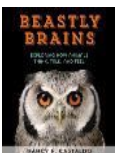
-Vicky Horner

“If a master is not equal in his ways towards his dogs, the dogs are very apt to discover the injustice and to resent it accordingly.”

-Charles Darwin

“Scientists are now studying dolphins and let us hope that we someday will have a more intimate relationship with one of the most intelligent and friendly creatures, which may even help us to communicate with other forms of life. Who knows what frontier this might lead to.”

-Nancy F. Castaldo



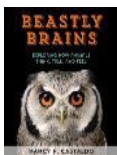
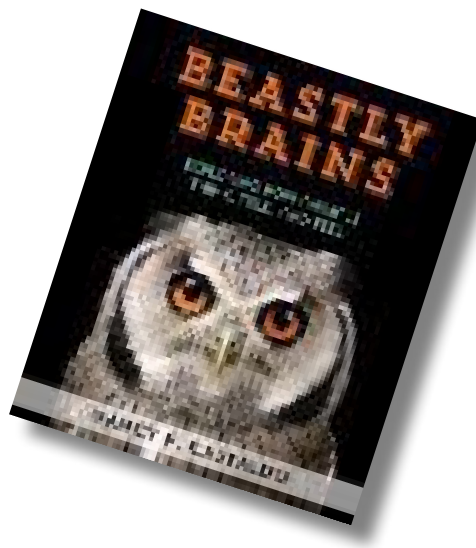
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BEASTLY BRAINS DROPPED PHRASE PUZZLE CLUES

1. The ability to understand that yesterday is different from today and tomorrow will also be different.
2. The village of Liège, Belgium, trained thirty-seven of these animals to deliver mail.
3. The ability to recollect the self in another period of time, a mental time travel of sorts.
4. The Nonhuman Rights Project is trying to establish laws to protect _____.
5. An Estonian children's story about a girl attending a friend's birthday party illustrates the reasoning behind this test.
6. Primates and other animals have the ability to use _____.
7. This primate shares 98.5 percent of our DNA and possess many human-like traits.
8. A type of bird with a big brain that exhibits many remarkable behaviors.
9. Elephants are not only self-aware, they possess unparalleled ____-____ skills.



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BEASTLY BRAINS DROPPED PHRASE PUZZLE ANSWERS

1. CEIROSTENHAHS **c h r o n e s t h e s i a**
28 32 39 2 11 43 15 12

2. CAST **c a t s**
18 8

3. DIICEPSO RGMIRNEBMEE **e p i s o d i c** **r e m e m b e r i n g**
35 37 34 22 1 17

4. MANLAI WAREFLE **a n i m a l** **w e l f a r e**
42 25 29 40 21 5 38 33

5. NOSPO **s p o o n**
31 10 30

6. LOSTO **t o o l s**
27 4

7. SOOBONB **b o n o b o s**
16 7

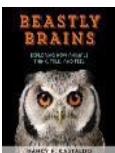
8. SICDOVR **c o r v i d s**
9 13 23 24 36

9. RBLOEMP-GNVIOLS **p r o b l e m** - **s o l v i n g**
20 6 14 44 19 41 3 26

U n t i l **w e** **s t o p** **h a r m i n g** **a l l** **l i v i n g**
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

b e i n g s , **w e** **a r e** **s t i l l** **s a v a g e s** .
27 28 29 30 26 31 5 32 33 34 35 36 8 37 38 38 39 40 41 42 26 43 44

~Thomas Edison



ETHOGRAM DISCOVERY

Some observed their subjects at set times, such as every hour or half-hour, and then selected behaviors from a list to describe their observations. That catalog of behaviors is called an ethogram. (pg. 23).

OBJECTIVE: To create a sample ethogram by recording, analyzing, and categorizing an animal's observable behavior patterns.

MATERIALS:

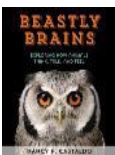
- Ethogram Discovery Log (Guide, pg. 18)
- Ethogram List (Guide, pg. 19)
- Pencil
- Clipboard
- Timer
- An animal to observe at a consistent setting on a scheduled basis

PROCEDURE 1 - ETHOGRAM DISCOVERY LOG:

- Print at least 10 copies of the **Ethogram Discovery Log**. Attach copies to a clipboard.
- Fill out log in the following manner:
 - ~ Write your name in the section labeled OBSERVER'S NAME.
 - ~ Identify the type of animal being observed in the section labeled ANIMAL OBSERVED.
 - ~ Identify and describe the location where you will be performing the observations in the section labeled ENVIRONMENT DESCRIPTION.
 - ~ State the length of time that you plan to make scheduled observations in the section labeled LENGTH OF SESSION. Every hour, half-hour or fifteen-minute segments of time will do. Just make certain that you are consistent about this aspect of the observation process.
 - ~ In order to gather enough data to make a beneficial study, you will need to complete at least five observation sessions. Write the session number in the space provided.
 - ~ In the section labeled TIME, log the actual time during which you are making observations in five minute increments. For example, you might begin your session at 3:00. Write that time down, followed by 3:05, 3:10, 3:15 and so on.
 - ~ In the section labeled BEHAVIOR DESCRIPTION, tell what the animal is doing. For example, one entry might be something like, "Tilting head, listening to fire engine siren," or "Raised ears, lifts tail at the sight of a squirrel."
- Gather data to analyze using the **Ethogram List**.

PROCEDURE 2 - ETHOGRAM LIST:

- Print 1 copy of the **Ethogram List**.
- Fill out the form in the following manner:
 - ~ Write your name in the section labeled OBSERVER'S NAME.
 - ~ Identify the type of animal being observed in the section labeled ANIMAL OBSERVED.

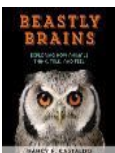


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- ~ State the length of time your scheduled observations were held in the section labeled LENGTH OF SESSIONS.
- ~ In the section labeled NUMBER OF SESSIONS, state how many sessions you completed. Note that the minimum number of sessions required to discover some sort of predictable behavior patterns is five.
- ~ Identify repeated behavior patterns in the section labeled REPEATED BEHAVIOR DESCRIPTION. For example, a dog might whimper when looking at another dog passing by. You may have observed the dog repeatedly behaving in this way. If so, describe and record the behavior in the space provided.
- ~ Predict what the observed behavior reveals about the animal's nature or needs. Is the animal communicating a message of some kind through this repeated behavior pattern? If so, what do you think that might be? Can you give the repeated behavior a name? Make a prediction or comment about the behavior in the space provided.
- List the ethogram(s) you discovered. Identify what the behavior(s) reveal about the way that your animal thinks and feels. Use the observation and data acquired to justify your claim(s).
- Write an informative/explanatory essay describing your process and findings.
- Present your findings to your class.



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Ethogram List

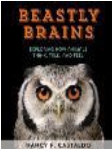
OBSERVER'S
NAME

ANIMAL
OBSERVED

LENGTH OF
SESSIONS

NUMBER OF
SESSIONS

REPEATED BEHAVIOR DESCRIPTION	COMMENTS/ PREDICTIONS



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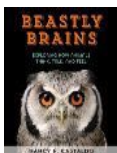
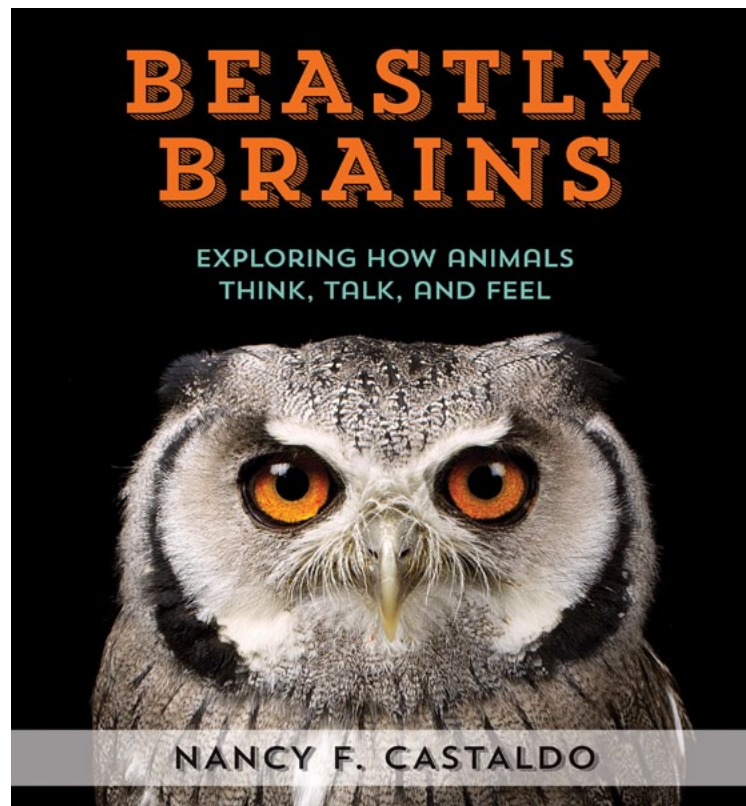
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MEET THE AUTHOR - NANCY F. CASTALDO



Nancy Castaldo is an author and photographer living in New York State's beautiful Hudson Valley. She has swum with sea turtles in the South Pacific, hiked with monkeys in Puerto Rico, and bonded with a barred owl. Nancy is the regional advisor for SCBWI- Eastern NY and loves speaking to students about her research adventures. She lives with her husband, a cat named Zuzu, and a brainy Bichon named Boo Radley. To learn more about Nancy and her many fascinating projects access her website at www.nancycastaldo.com.



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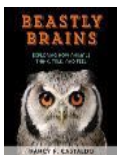


ACADEMIC STANDARDS ALIGNMENT

Common Core State Standards:

English Language Arts Standards » Reading: Informational Text

		Crossword Puzzle	Memes	Acrostic Puzzle	Dropped Phrase Puzzle	Ethogram Project
CCSS.ELA-Literacy.RI.7.1	Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	●	●	●		
CCSS.ELA-Literacy.RI.7.3	Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).	●	●	●	●	●
CCSS.ELA-Literacy.RI.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.	●		●	●	
CCSS.ELA-Literacy.RI.7.10	By the end of the year, read and comprehend literary nonfiction in the grades 6-8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	●	●	●	●	●
CCSS.ELA-Literacy.RI.8.1	Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	●	●	●		
CCSS.ELA-Literacy.RI.8.2	Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.	●	●	●	●	●
CCSS.ELA-Literacy.RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).	●	●	●	●	●
CCSS.ELA-Literacy.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.	●		●		
CCSS.ELA-Literacy.RI.8.10	By the end of the year, read and comprehend literary nonfiction at the high end of the grades 6-8 text complexity band independently and proficiently.	●	●	●	●	●
CCSS.ELA-Literacy.RI.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	●	●	●		
CCSS.ELA-Literacy.RI.9-10.2	Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.	●	●	●	●	●
CCSS.ELA-Literacy.RI.11-12.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.	●	●	●		
CCSS.ELA-Literacy.RI.11-12.3	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.	●	●	●	●	●



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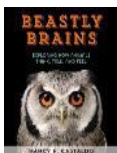


English Language Arts Standards » Writing

		Crossword Puzzle	Memes	Acrostic Puzzle	Dropped Phrase Puzzle	Ethogram Project
CCSS.ELA-Literacy.W.7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.		●		●	●
CCSS.ELA-Literacy.W.7.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		●		●	●
CCSS.ELA-Literacy.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.		●		●	●
CCSS.ELA-Literacy.W.8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		●		●	●
CCSS.ELA-Literacy.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.		●		●	●
CCSS.ELA-Literacy.W.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		●		●	●
CCSS.ELA-Literacy.W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.		●		●	●
CCSS.ELA-Literacy.W.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.		●		●	●

English Language Arts Standards » Speaking & Listening

CCSS.ELA-Literacy.SL.7.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.					●
CCSS.ELA-Literacy.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.					●
CCSS.ELA-Literacy.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.					●
CCSS.ELA-Literacy.SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.					●



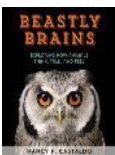
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Next Generation Science Standards:

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics		Crossword Puzzle	Memes	Acrostic Puzzle	Dropped Phrase Puzzle	Ethogram Project
MS-LS2-1.	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.					●
MS-LS2-2.	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.					●
Crosscutting Concepts-Patterns						
	Patterns can be used to identify cause and effect relationships.					●



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