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Amazon tribe passes geometry test

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THE ARTICLE

Amazon tribe passes geometry test

Researchers in France and at Harvard University have discovered that isolated indigenous tribes in the Amazon are as capable as high schoolers of applying basic concepts of geometry. Research showed that although the tribes-people were not conversant with the jargon of geometry, they did understand points, lines and right angles. They could also use distance, angle and other relationships in maps to locate hidden objects. Dr. Elizabeth Spelke, a co-researcher of the study, said: "These concepts allow adults and children with no formal education, and minimal spatial language, to categorize geometrical forms and to use geometrical relationships to represent the surrounding spatial layout." She concluded that geometry is innate in all humans, regardless of their schooling.

The study of geometrical awareness was conducted on the Munduruku people, who live in an isolated and remote part of Brazil's Cururu River. Co-author Stanislas Dehaene said: "Although there has been a lot of research on spatial maps, navigation and sense of direction, there is very little work on the conceptual representations in geometry." He questioned: "What is meant by 'point,' 'line,' 'parallel,' 'square' versus 'rectangle'? All are highly idealized concepts never met in physical reality. Our work is a first start in the exploration of these concepts." The Munduruku took geometry tests over a two-year period and results showed that adults and children rivaled the performance of American children in separate testing conducted by the scientists.

Source: http://www.sciencemag.org/

WARM-UPS

1. AMAZONIAN: You live deep in the rainforest in the Amazon. Talk to the other "Amazon dwellers" in the class about life in the rainforest. Are you good at numbers and geometry? What things in your everyday life do you need numbers and angles for? Compare to see who has the most uses for these things.

2. CHAT: In pairs / groups, decide which of these topics or words are most interesting and which are most boring.

> *Researchers / Harvard / indigenous tribes / geometry / jargon /maps / formal education / sense of direction / right angles / squares / rectangles / tests / concepts*

Have a chat about the topics you liked. For more conversation, change topics and partners frequently.

3. PREDICTION: Talk with your partner(s) about what you think the article will be about. Use the words in the "chat" section above to help you. Change partners and share and compare your predictions.

4. INNATE ABILITIES: Talk about the following innate abilities, shared at birth by all humans. Which are the most important to you? Which would you like to better hone and develop?

a. Geometry skills
b. Language learning ability
c. Capacity for great love
d. Balancing
e. Singing
f. Using our hands to make things
g. Sense of direction
h. Riding a bicycle

5. GEOMETRY: Spend one minute writing down all of the different words you associate with the word "geometry". Share your words with your partner(s) and talk about them. Together, put the words into different categories.

6. SCHOOL: Are you good with numbers? In pairs / groups, talk about the following. Were you good at these things at school? Are you good at them now?

a. Geometry
b. Mental arithmetic
c. Algebra
d. Long division
e. Statistics
f. Trigonometry

BEFORE READING / LISTENING

1. TRUE / FALSE: Look at the article's headline and guess whether these sentences are true (T) or false (F):

a. Amazon tribes people passed the Harvard University entrance test. T / F
b. Indigenous people in the Amazon know the jargon of geometry. T / F
c. The tribes people were able to locate hidden objects using maps. T / F
d. A researcher concluded knowledge of geometry is innate in all people. T / F
e. The Munduruku people live on the outskirts of Rio de Janeiro. T / F
f. A researcher said very little work has been done on sense of direction. T / F
g. Munduruku children took geometry tests as part of a ten-year study. T / F
h. Amazon children did as well as American children on geometry tests. T / F

2. SYNONYM MATCH: Match the following synonyms from the article:

a.	indigenous	as opposed to
b.	conversant	specialized language
c.	jargon	inherent
d.	categorize	far flung
e.	innate	classify
f.	conducted	native
g.	remote	guidance
h.	navigation	matched
i.	versus	familiar
j.	rivaled	carried out

3. PHRASE MATCH: Match the following phrases from the article (sometimes more than one combination is possible):

a.	as capable as high schoolers	education
b.	tribes-people were not conversant	of applying basic concepts
c.	…relationships in maps	of direction
d.	children with no formal	part of Brazil's Cururu River
e.	She concluded that geometry	on spatial maps
f.	an isolated and remote	is innate in all humans
g.	there has been a lot of research	of American children
h.	navigation and sense	with the jargon of geometry
i.	highly idealized concepts never	met in physical reality
j.	rivaled the performance	to locate hidden objects

WHILE READING / LISTENING

GAP FILL: Put the words in the column on the right into the gaps in the text.

Amazon tribe passes geometry test

Researchers in France and at Harvard University have discovered that _____ indigenous tribes in the Amazon are as _____ as high schoolers of applying basic concepts of geometry. Research showed that although the tribes-people were not _____ with the _____ of geometry, they did understand points, lines and _____ angles. They could also use distance, angle and other relationships in maps to locate hidden objects. Dr. Elizabeth Spelke, a co-researcher of the study, said: "These concepts allow adults and children with no _____ education, and minimal spatial language, to categorize geometrical forms and to use geometrical relationships to represent the surrounding spatial _____." She concluded that geometry is innate in all humans, _____ of their schooling.

conversant

formal

isolated

regardless

jargon

layout

capable

right

The study of geometrical _____ was conducted on the Munduruku people, who live in an isolated and _____ part of Brazil's Cururu River. Co-author Stanislas Dehaene said: "Although there has been a lot of research on spatial maps, navigation and sense of _____, there is very little work on the conceptual representations in geometry." He _____: "What is meant by 'point,' 'line,' 'parallel,' 'square' versus '_____'? All are highly idealized concepts never _____ in physical reality. Our work is a first start in the exploration of these concepts." The Munduruku took geometry tests over a two-year period and results showed that adults and children _____ the performance of American children in _____ testing conducted by the scientists.

rivaled

direction

rectangle

separate

awareness

met

remote

questioned

LISTENING

Listen and fill in the spaces.

Amazon tribe passes geometry test

Researchers in France and at Harvard University have discovered that _____ indigenous tribes in the Amazon are as _____ as high schoolers of applying basic concepts of geometry. Research showed that although the tribes-people were not _____ with the _____ of geometry, they did understand points, lines and right angles. They could also use distance, angle and other relationships in maps to _____ hidden objects. Dr. Elizabeth Spelke, a co-researcher of the study, said: "These concepts allow adults and children with no _____ education, and minimal spatial language, to categorize geometrical forms and to use geometrical relationships to represent the surrounding _____ layout." She concluded that geometry is _____ in all humans, regardless of their schooling.

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AFTER READING / LISTENING

1. WORD SEARCH: Look in your dictionaries / computer to find collocates, other meanings, information, synonyms … for the words **'right'** and **'angle'**.

- Share your findings with your partners.
- Make questions using the words you found.
- Ask your partner / group your questions.

2. ARTICLE QUESTIONS: Look back at the article and write down some questions you would like to ask the class about the text.

- Share your questions with other classmates / groups.
- Ask your partner / group your questions.

3. GAP FILL: In pairs / groups, compare your answers to this exercise. Check your answers. Talk about the words from the activity. Were they new, interesting, worth learning…?

4. VOCABULARY: Circle any words you do not understand. In groups, pool unknown words and use dictionaries to find their meanings.

5. STUDENT "GEOMETRY" SURVEY: In pairs / groups, write down questions about geometry, mathematics and other number-related areas of study.

- Ask other classmates your questions and note down their answers.
- Go back to your original partner / group and compare your findings.
- Make mini-presentations to other groups on your findings.

6. TEST EACH OTHER: Look at the words below. With your partner, try to recall exactly how these were used in the text:

- discovered
- basic
- jargon
- locate
- formal
- innate
- conducted
- navigation
- sense
- questioned
- exploration
- rivaled

DISCUSSION

STUDENT A's QUESTIONS (Do not show these to student B)

a. Did the headline make you want to read the article?
b. Are you good at geometry?
c. Did you like things like geometry and math (maths) at school?
d. Are you surprised at the conclusions of this research?
e. Do you think you might have a better sense of direction than the indigenous tribes in the Amazon?
f. Do you think your geometry skills might be better than those of the indigenous tribes?
g. Are you good at reading maps?
h. What innate abilities do you think are most important?
i. What do you think is the use of such a study?
j. What is meant by 'point,' 'line,' 'parallel' and 'square' versus 'rectangle'?

STUDENT B's QUESTIONS (Do not show these to student A)

a. Did you like reading this article?
b. What do you think about what you read?
c. Are you conversant with the jargon of geometry?
d. What other kinds of English jargon are you conversant with?
e. What everyday things do you think the indigenous people use geometry for?
f. Would you like to conduct a two-year study in the Amazon?
g. Would you prefer to study the people of the Amazon or the flora and fauna?
h. What do you think American schoolchildren will think about this study?
i. Would you swap your life to live in the Amazon rainforest?
j. Did you like this discussion?

AFTER DISCUSSION: Join another partner / group and tell them what you talked about.

a. What was the most interesting thing you heard?
b. Was there a question you didn't like?
c. Was there something you totally disagreed with?
d. What did you like talking about?
e. Which was the most difficult question?

SPEAKING

SCHOOL SUBJECTS: Do all children around the world learn the same things? In pairs / groups, talk about the differences between what the children of the Munduruku might learn in class compared with what children in your country learn.

SUBJECT	MUNDURUKU PEOPLE	YOUR COUNTRY
Geometry		
History		
Geography		
Literature		
Physical education		
Music		
Crafts		

Change partners and share and compare your ideas.

Talk about what parts of the Munduruku education you would also like to receive.

HOMEWORK

1. VOCABULARY EXTENSION: Choose several of the words from the text. Use a dictionary or Google's search field (or another search engine) to build up more associations / collocations of each word.

2. INTERNET: Search the Internet and find more information on the Munduruku tribe. Share your findings with your class in the next lesson. Did you all find out similar things?

3. GEOMETRY: Write an essay about why you think geometry is important in our lives. Read your essay to your partner(s) in your next class. Did you all write about similar things?

4. A DAY IN THE LIFE: You live deep in the Amazon rainforest. Write an account of one day in your life. What are your thoughts on what is happening in the world today? Read what you wrote to your classmates in the next lesson. Did everyone have similar days and thoughts?

ANSWERS

TRUE / FALSE:

a. F b. F c. T d. T e. F f. F g. F h. T

SYNONYM MATCH:

a.	indigenous	native
b.	conversant	familiar
c.	jargon	specialized language
d.	categorize	classify
e.	innate	inherent
f.	conducted	carried out
g.	remote	far flung
h.	navigation	guidance
i.	versus	as opposed to
j.	rivaled	matched

PHRASE MATCH:

a.	as capable as high schoolers	of applying basic concepts
b.	tribes-people were not conversant	with the jargon of geometry
c.	…relationships in maps	to locate hidden objects
d.	children with no formal	education
e.	She concluded that geometry	is innate in all humans
f.	an isolated and remote	part of Brazil's Cururu River
g.	there has been a lot of research	on spatial maps
h.	navigation and sense	of direction
i.	highly idealized concepts never	met in physical reality
j.	rivaled the performance	of American children

GAP FILL:

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Researchers in France and at Harvard University have discovered that **isolated** indigenous tribes in the Amazon are as **capable** as high schoolers of applying basic concepts of geometry. Research showed that although the tribes-people were not **conversant** with the **jargon** of geometry, they did understand points, lines and **right** angles. They could also use distance, angle and other relationships in maps to locate hidden objects. Dr. Elizabeth Spelke, a co-researcher of the study, said: "These concepts allow adults and children with no **formal** education, and minimal spatial language, to categorize geometrical forms and to use geometrical relationships to represent the surrounding spatial **layout**." She concluded that geometry is innate in all humans, **regardless** of their schooling.

The study of geometrical **awareness** was conducted on the Munduruku people, who live in an isolated and **remote** part of Brazil's Cururu River. Co-author Stanislas Dehaene said: "Although there has been a lot of research on spatial maps, navigation and sense of **direction**, there is very little work on the conceptual representations in geometry." He **questioned**: "What is meant by 'point,' 'line,' 'parallel,' 'square' versus '**rectangle**'? All are highly idealized concepts never **met** in physical reality. Our work is a first start in the exploration of these concepts." The Munduruku took geometry tests over a two-year period and results showed that adults and children **rivaled** the performance of American children in **separate** testing conducted by the scientists.