Study Information Page

[IMPORTANT: To guarantee optimal circumstances for this survey, please fill out this survey using Google Chrome, and make sure to reset the display zoom to default by pressing STRG+0 (Windows) or CMD+0 (Mac OS)]

Please take your time to read through this study information sheet:

You are invited to participate in a research study of the effectiveness of a new visualization interface in development. We ask that you read this form and ask any questions you may have before agreeing to be in the study. The study is being conducted by Dr. Katy Borner (katy@indiana.edu) and Andreas Bueckle (abueckle@indiana.edu) from the School of Informatics and Computing as well as Dr. Rob Goldstone (rgoldsto@indiana.edu) from the Department of Psychological and Brain Sciences. It is funded by the National Institutes of Health.

STUDY PURPOSE

The purpose of this study is to explore how users interact with and understand information as provided by data visualizations (such as charts, graphs and tables). We want to know what aspects of visualizations are easy to understand and what parts are confusing or difficult to read. Specifically, we intend to explore the readability and usability of a map-based visualization.

NUMBER OF PEOPLE TAKING PART IN THE STUDY

If you agree to participate, you will be one of ~40 subjects who will be participating in this research.

PROCEDURES FOR THE STUDY

If you agree to be in the study, you will do the following things:
You will complete a pre-questionnaire that will gather basic demographic information as well as some information about your current usage and comfort with data visualizations. Subsequently,

you will perform a spatial reasoning test where you will be asked to reconstruct cubes from planes, and to count 3D objects.

After this, you will be given time to interact with and explore a data visualization as assigned by the researchers. You will be given a second questionnaire that asks specific questions about the data to determine how well the visualization helps you find the answers. Finally, you will be presented with a post-questionnaire where you can share ideas for improvement. The study will take approximately 45 minutes of your time.

RISKS OF TAKING PART IN THE STUDY

The risks of participating in this research are discomfort answering questions about unfamiliar visualizations. Please be aware that you can terminate your participation in the study at any time.

CONFIDENTIALITY

Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored.

Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the study investigator and his/her research associates, the Indiana University Institutional Review Board or its designees, the study sponsor, and (as allowed by law) state or federal agencies, specifically the Office for Human Research Protections (OHRP), the National Institutes of Health (NIH), etc., who may need to access your research records.

PAYMENT

You will receive 1 SONA credit for completion of this survey. Also, please note that there is an alternative assignment. You can inquire about the alternative assignment from their instructor.

CONTACTS FOR QUESTIONS OR PROBLEMS

For questions about the study, please contact researcher Andreas Bueckle at abueckle@indiana.edu or 812-527-7502.

For questions about your rights as a research participant or to discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IU Human Subjects Office at 812-856-4242.

VOLUNTARY NATURE OF STUDY

Taking part in this study is voluntary. You may choose not to take part or may leave the study at any time. Leaving the study will not result in any penalty or loss of benefits to which you are entitled. Your decision whether or not to participate in this study will not affect your current or future relations with the School of Informatics and Computing.

Pre-Questionnaire

Please answer the following questions below to help us understand your background and experience.

What us your job title?

What is your department/specialization?

Are you a student?

- ○ Yes
- ○ No

Please select:

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior
- ○ Other, please specify:

Please indicate your age:

- ○ 18-20
- ○ 21-30
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ >60

Please indicate your gender:

- ○ Male
- ○ Female
- ○ Other
- ○ I prefer not to answer

What is your native language?

- ☐ English
- ☐ other(s), please list: _____

How comfortable are you reading tables, charts and graphs?

	Very uncomfortable	Somewhat uncomfortable	Neither comfortable nor uncomfortable	Somewhat comfortable	Very comfortable
I am...	○	○	○	○	○

In your daily work, what hardware do you regularly use? (check all that apply)

- ☐ Desktop
- ☐ Laptop
- ☐ Tablet

- [ ] Phone
- [ ] Other (please specify):

What data visualizations (such as graphs, charts or tables) do you use for your research/work?

Have you ever taken a visualization course, training or seminar?

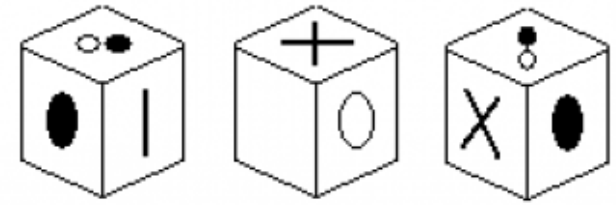
- ○ Yes
- ○ No

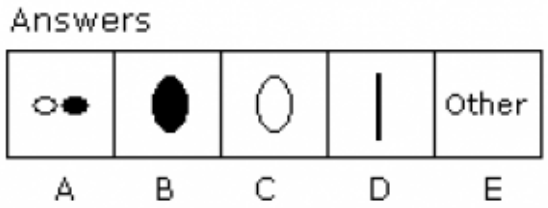
Please specify which course, training, or seminar you took?

Spatial Ability Test

Spatial Ability Test

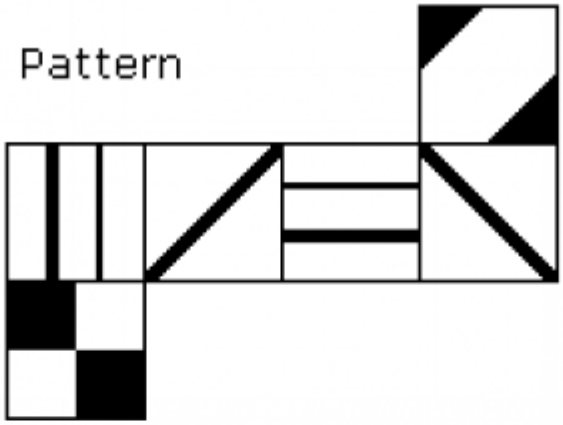
In the following section, we will test your spatial reasoning skills. Please answer to the best of your knowledge.

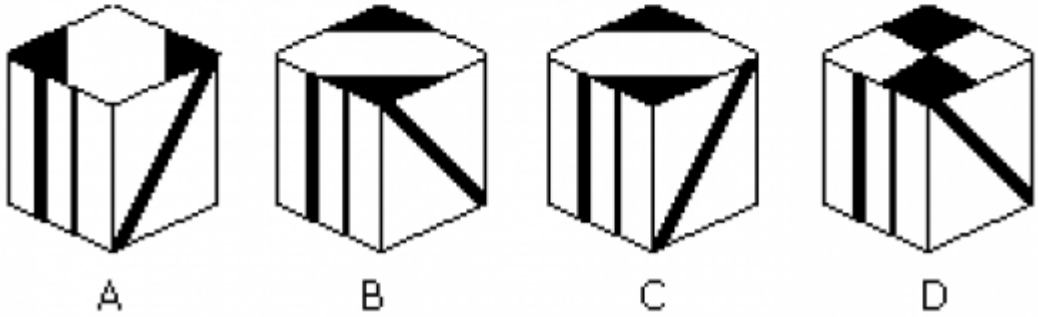




Which symbol is opposite to the X on the exact opposite side of the cube?

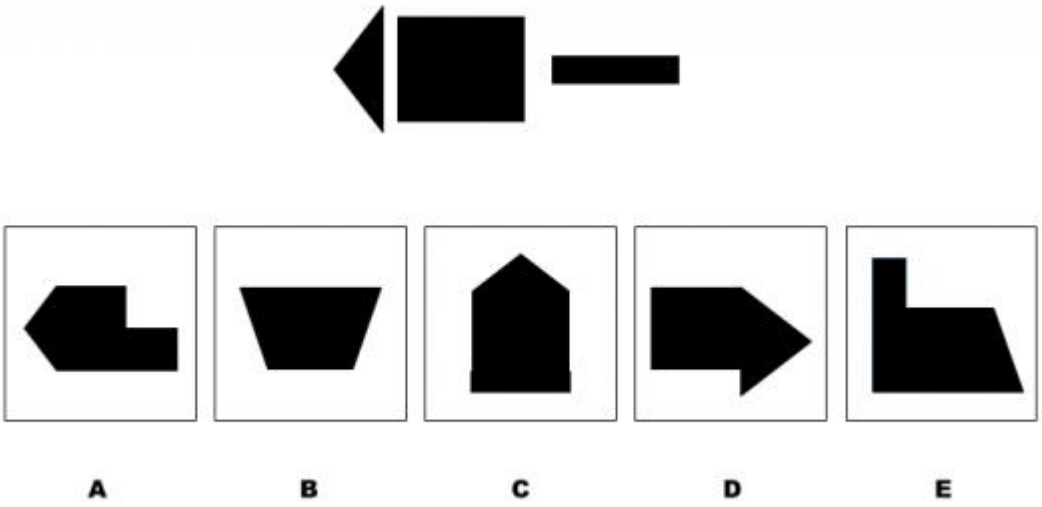
- A
- B
- C
- D
- E





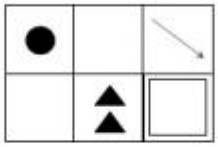
Which of the cubes shown could be made from the pattern?

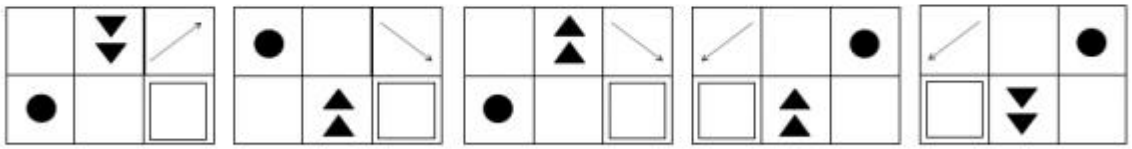
- A
- B
- C
- D



Which image can be made from the three shapes shown?

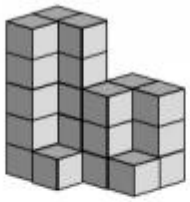
- A
- B
- C
- D
- E





Which answer shows a mirror reflection of the image below?

- A
- B
- C
- D
- E



28	18	25	27	26
A	B	C	D	E

How many cubes does this figure have, including hidden cubes?

- A
- B
- C
- D
- E

Arranging Disciplines

On the next page, you will be presented with a screenshot of a data visualization. Please be prepared to inspect the image and follow the instructions.

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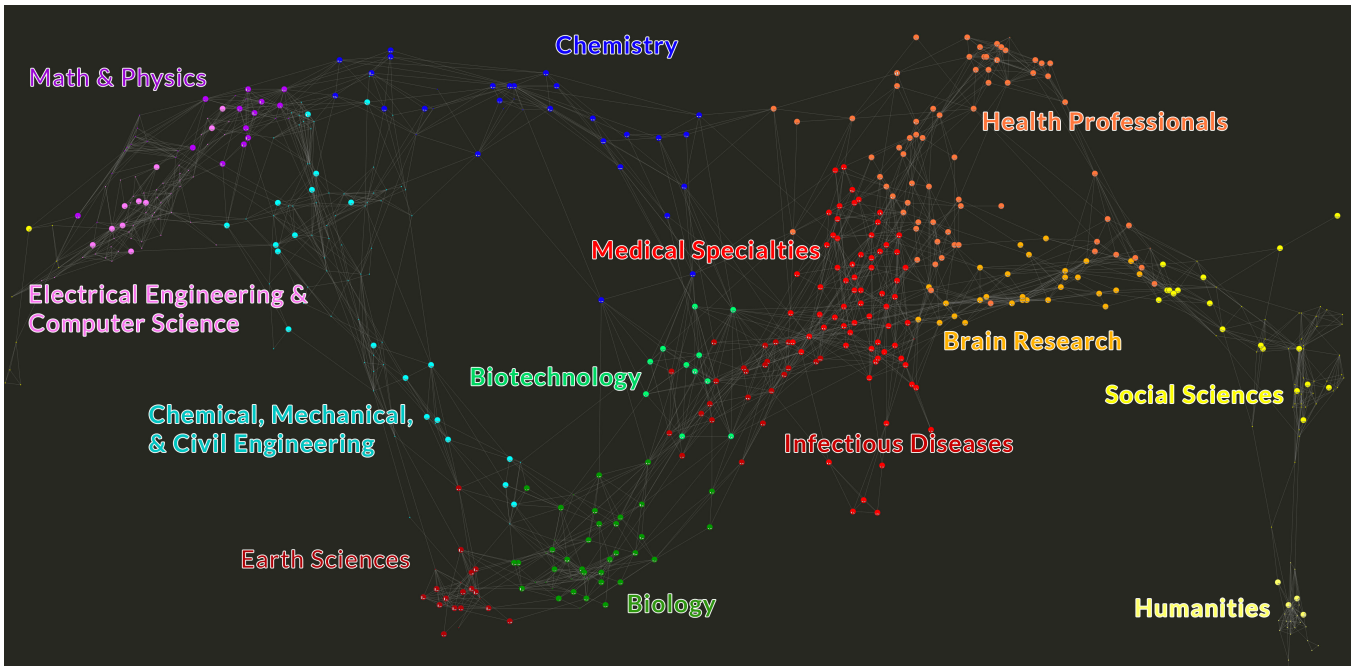
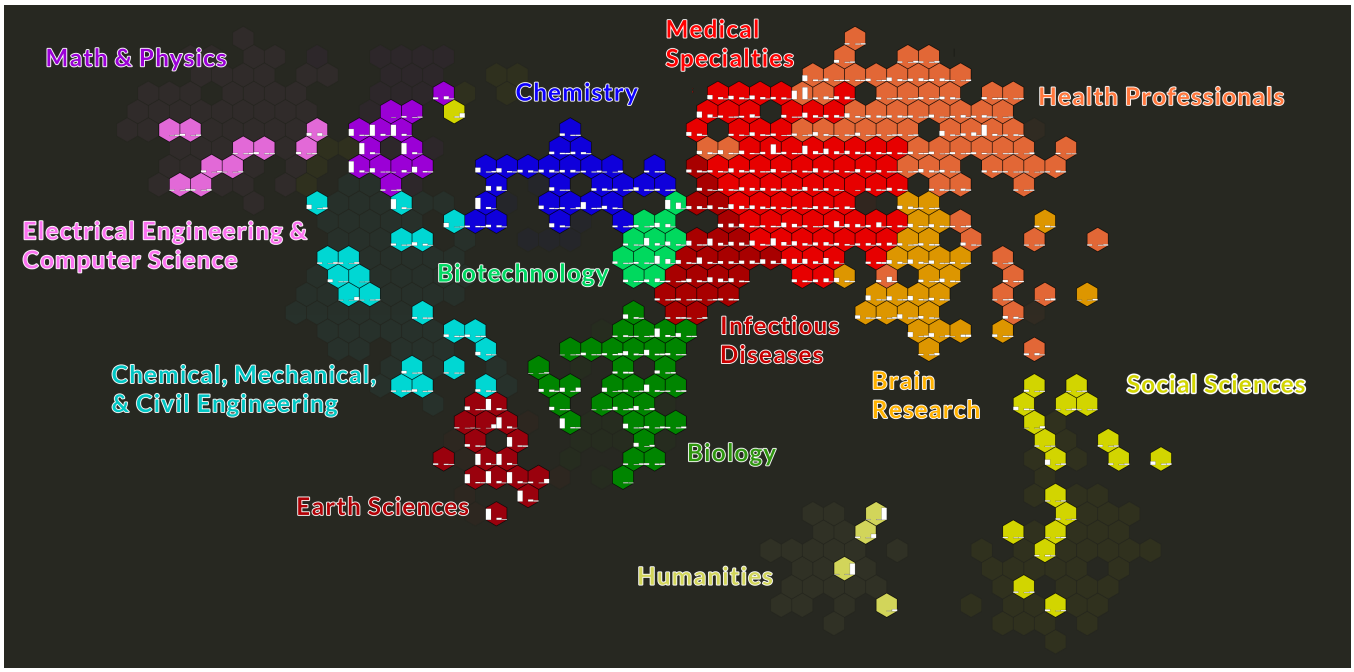
00 00 05

Please memorize the spatial locations of the 13 discipline labels. You have 3 minutes.





For the next part of the experiment, please **copy & paste** the link below into a new tab in your browser. When you are done with that part of the experiment, please close that tab, and continue with the survey in this tab!
If for any reason you close this tab that Qualtrics is running in, just click the link through which you accessed the survey, and you will be redirected here without losing your progress.

https://www.indiana.edu/~pcl/robsexperiments/tests&examples/fieldArrange.html?ResponseID=${e://Field/ParticipantID}

Questionnaire UCSD/Hex Map

To begin, please copy & paste the following link into a new tab in your browser (NOTE: This is NOT the same link you copy&pasted before): http://demo.cns.iu.edu/econ-p/ucsdmap.html

Pease leave this tab open for the rest of the experiment, switching back and forth between the tabs containing the visualization and the survey.
Before you proceed to the next page in this survey, please experiment with the filters and functionality to get a feel for how it works.

Description:
In what areas of science is research performed? This map shows papers, patents, and grants overlaid on a science map. Please read the "About" section by clicking on the "?" in the upper right corner of the tab in which you have opened the visualization.

Subsequently, please answer the following questions based only on information you gather from the visualization itself. When possible, make a best guess if you are unsure, though if you have no idea, writing “I don’t know” is still helpful in improving our understanding.

To begin, please copy & paste the following link into a new tab in your browser:
http://demo.cns.iu.edu/econ-p/hexmap.html

Pease leave this tab open for the rest of the experiment, switching back and forth between the tabs containing the visualization and the survey.
Before you proceed to the next page in this survey, please experiment with the filters and functionality to get a feel for how it works.

Description:
In what areas of science is research performed? This map shows papers, patents, and grants overlaid on a science map. Please read the "About" section by clicking on the "?" in the upper right corner of the tab in which you have opened the visualization.

Subsequently, please answer the following questions based only on information you gather from the visualization itself. When possible, make a best guess if you are unsure, though if you have no idea, writing “I don’t know” is still helpful in improving our understanding.

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What type of visualization is shown?

- ○ Map
- ○ Graph
- ○ Chart
- ○ Network

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Please answer the following questions while using the tools on the right side of the visualization screen. This visualization is showing disciplines of science as well as subdisciplines. Disciplines are indicated by the colored text labels that are always visible. Subdisciplines are marked by individual hexagons. The name of the subdiscipline is revealed when you hover over the corresponding hexagon.

You can apply filters in the "Metrics" section on the right side. This means that you can turn the display of certain kinds of information in the visualization on and off. Whenever you choose a filter by checking the appropriate checkbox, please also hit the "Filter" button to activate the selected filters.

If you apply a metric, you can see its value as a white bar within a hexagon. This indicates the value of the selected metric in this subdiscipline.

Note: If you select more than one metric, the value of each metric is visualized with a histogram in the hexagon of each subdiscipline. The uppermost metric is displayed in the leftmost bar of the histogram, the downmost metric is displayed in the rightmost bar.

Which subdiscipline has the highest "Number of New Concepts"?

Subdiscipline

Please answer the following questions while using the tools on the right side of the visualization screen. This visualization is showing disciplines of science as well as subdisciplines. Disciplines are indicated by the colored text labels that are always visible. Subdisciplines are marked by individual nodes (circles). The name of the subdiscipline is revealed when you hover over the corresponding node.

You can apply filters in the "Metrics" section on the right side. This means that you can turn the display of certain kinds of information in the visualization on and off. Whenever you choose a filter by checking the appropriate checkbox, please also hit the "Filter" button to activate the selected filters.

If you apply a metric, you can see its value encoded in the size of each node (circle). This indicates the value of the selected metric in this subdiscipline.

Note: If you select more than one metric, the value of each metric is visualized with a histogram in the node of each subdiscipline. The uppermost metric is displayed in the leftmost bar of the histogram, the downmost metric is displayed in the rightmost bar.

Which subdiscipline has the highest "Number of New Concepts"?

Subdiscipline

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Click Count: *0 clicks*

On average, is "Number of New Concepts" highest in Cancer Statistics, Endoscopic Surgery, or Environmental Contamination?

Remember: You can apply additional filters in the "Metrics" section on the right side. This means that you can turn the display of certain kinds of information in the visualization on and off. Whenever you choose a filter by checking the appropriate checkbox, please also hit the "Filter" button to activate the selected filters.

Note: If you have trouble finding a subdiscipline, you can type it into the search box in the upper right corner, and "Ping" the desired subdiscipline.

- ○ Cancer Statistics

- ○ Endoscopic Surgery
- ○ Environmental Contamination

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Please answer the following question by using the legend on the bottom of the screen.
When you click on a subdiscipline - any will do - , what sort of information do you find?

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Click Count: *0 clicks*

Find the **Thermal Analysis** subdiscipline. You can find it by typing it into the "subdiscipline" search box on the top right corner of the visualization screen. Then

click "Ping". The appropriate node in the visualization will start blinking. Click "Stop" to turn it off.

Once you have found the Thermal Analysis subdiscipline, apply the filter "Number of Citations". Use the filter selection on the right to do so. Subsequently, click on the subdiscipline to reveal a list of the papers with the highest number of citations within the selected subdiscipline. This list is ordered so the entry with the highest number of citations is on top of the list.

Then, answer the following question: What is the first name of the first author on the paper with the highest "Number of Citations"?

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How many disciplines and sub-discipines are there in total?
Tip: You do not need to count! You can find the information by exploring the visualization.

Post-Questionnaire

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How much did you like the visualization?

	Not at all	Somewhat	Neither liked it nor disliked it	Somewhat	Very much
I liked it...	○	○	○	○	○

Was it easy to use the visualization?

	Not easy at all	Not very easy	Neither easy nor hard	Somewhat easy	Very easy
It was	○	○	○	○	○

What did you like about the visualization?

What did you dislike about the visualization?

What can be done to improve the visualization?

What sorts of information or insights did you find easy to locate within the visualization?

What sorts of information or insights did you find difficult to locate within the visualization?

Thank you very much for your input!

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