

Supplemental Materials: Procedures

EcoChains Recruitment Flyer

EcoChains Study MASTER Facilitator Guide – includes pre and post surveys

EcoChains Follow-Up Surveys

\$50 Paid Research Study

WHO:

Adults, 18 years and older

WHERE:

GRG's Cambridge, MA office

WHEN:

10am-12pm OR 1-3pm
on one of these dates:

- February 28
- March 1
- March 7
- March 8

WHAT:

Participate in one in-person group session to help with the development of a new educational game created at Columbia University. Participation will involve:

- Reviewing materials with a small group of other adults;
- Completing surveys online; and
- Answering some questions about your experience

This will take no longer than two hours. We will also ask you to complete a 5-minute online survey about one month later. All participants will receive \$50 as a thank you for participation after the in-person session.

SIGN UP NOW!

Please use [THIS FORM](#)
to sign up or email
Emma Lukasiewicz
lukasiewicz@grginc.com
with any questions!

EcoChains Study
Goodman Research Group, Inc.
Facilitator Guide

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Welcome and Consent Form (5 mins)

West Wing Lobby

Facilitator Notes

- Facilitators arrive 30-45 mins early; participants expected to arrive 15 mins early
- Prior to participant arrival:
 - Heat and lights on in both wings; extra toilet paper in bathrooms
 - Phone off “nite mode” (participants have been instructed to call if running late)
 - Tables and supplies arranged in large conference room
 - Pre- and post-surveys pulled up on computers; PowerPoint and video on projector
- Front door will be locked:
 - One facilitator will be downstairs letting people in
 - One facilitator will be upstairs checking people in and answering the phone
- We will wait 10 minutes for participants to show up for the study; after 10 minutes or once the introduction is complete, if a participant has not arrived or called to explain, they will be considered a no-show
- Good idea to time each activity to make sure study stays on track

Check In and ID Numbers

- Check-in sheet will contain participants’ names
- Participants will create a unique ID for themselves based on their street address and phone number; they will write this ID on the check-in sheet and use it throughout the study and for the follow-up study (letters should be in CAPS for clarity)
- Direct each participant to create a name tag for themselves using the sticker name tags and sharpie (they should just put first name)

First Name	Last Name	ID Number (First 3 Letters of Street Address + Last 4 Digits of Phone Number)
John	Doe	COM-5555
Jane	Doe	MAS-1234
[PREFILLED]	[PREFILLED]	[PARTICIPANTS ENTER THEMSELVES]

Consent Forms

- After a participant has checked in: give them 2 consent forms and a pen, and direct them to the conference room where they can sit, read one form and sign it
- Once all participants are checked in and have signed their consent forms, one facilitator will collect them and store them in safe spot in office

CONSENT TO PARTICIPATE
PoLAR Learning and Responding (PoLAR)
EcoChains
Group Discussion

Purpose and Goals: This discussion group is part of the evaluation of the PoLAR project being conducted by Goodman Research Group, Inc. (GRG), an education research group in Cambridge, Massachusetts. The goal of the evaluation is to see if the PoLAR project is creating resources that will meet the program goals and to make recommendations for improving those resources. The evaluation is being conducted for the National Science Foundation (NSF). NSF is the primary funder of the PoLAR program.

Your perspective as a potential user of the PoLAR resources is very valuable to us. Our goal today is to show you one of the current resources and to see and hear your thoughts about it. You will complete a survey before and after using the resource, and then participate in a brief group discussion. We'll summarize survey responses, and what we hear, and share it with the PoLAR development team (Columbia University). Your feedback will be used to help improve the program.

Confidentiality and Freedom to Withdraw: Your survey responses and anything you say in the discussion is confidential. We won't use your names in our report to the project team or link names to comments or responses in any reporting. No one outside the GRG research team will have access to data that could be linked to individuals. As a volunteer in this study, you may withdraw at any time — or choose not to answer specific questions — without consequences of any kind.

If you have questions about the research, please feel free to contact: [Contact information for Director of Research at GRG].

PARTICIPANT SIGNATURE

I understand the research purpose, goals, and methods of this discussion group. My questions have been answered and I voluntarily agree to participate in this study. I have been given a copy of this form.

Name (please print): _____

Signature: _____ Date: _____

Introduction (3 mins)

Large Conference Room

Experimental Condition

Read Out:

Thank you for coming and welcome to GRG. My name is [Name A] and this is [Name B] and we will be facilitating today's study session. Before we begin, let's go around the room and everyone please introduce yourself – just your first name is fine – and share one of your main interests or hobbies.

Great, thanks. Now I am going to give you a quick overview of the study. The next 2 hours will be divided into 3 parts. As some of you may have noticed when you came in, our office is divided into two different spaces, one on either side of the elevators, so for some parts, we will all go over to the other side of the office. For the first 10-15 minutes of the study, you will be asked to complete a short questionnaire before playing a game developed by the PoLAR team at Columbia University.

Then you will play the game for about 45 mins. After playing the game, you will complete another questionnaire for another 10 minutes. Finally, we will have a brief discussion at the end about your experience and opinions relating to this study.

You each created a participant ID when you checked in based on the first three letters of your street address and last four numbers of your phone number. This will be your unique participant ID throughout the study. You will be asked for it a few times throughout this session, for example on the questionnaires.

Any questions so far? *[If they ask about what PoLAR is, explain that PoLAR is a project working on different types of educational resources and that our study is focused on a resource about arctic ecosystems]*

Let's start: first, we are going to go over to the other side of the office where you will complete a questionnaire on a computer. It should take about 10 mins to complete. When you are all finished, we will come back to this room.

Control Condition

Read Out:

Thank you for coming and welcome to GRG. My name is [Name A] and this is [Name B] and we will be facilitating today's study session. Before we begin, let's go around the room and everyone please introduce yourself – just your first name is fine – and share one of your main interests or hobbies.

Great, thanks. Now I am going to give you a quick overview of the study. The next 1.5 to 2 hours will be divided into 3 parts. As some of you may have noticed when you came in, our office is divided into two different spaces, one on either side of the elevators, so for some parts, we will all go over to the other side of the office. For the first 10-15 minutes of the study, you will be asked to complete a short questionnaire before reading an article written by the PoLAR team at Columbia University.

Then you will read the article for about 20 mins. After reading, you will complete another questionnaire for another 10 minutes. Finally, we will have a brief discussion at the end about your experience and opinions relating to this study.

You each created a participant ID when you checked in based on the first three letters of your street address and last four numbers of your phone number. This will be your unique participant ID throughout the study. You will be asked for it a few times throughout this session, for example on the questionnaires.

Any questions so far? *[If they ask about what PoLAR is, explain that PoLAR is a project working on different types of educational resources and that our study is focused on a resource about arctic ecosystems]*

Let's start: first, we are going to go over to the other side of the office where you will complete a questionnaire on a computer. It should take about 10 mins to complete. When you are all finished, we will come back to this room.

Pre-Questionnaire (10 mins)

East Wing Offices

Facilitator Notes

- Qualtrics survey will already be pulled up on computers in East Wing offices
- Facilitators will stand in East Wing lobby to be accessible to participants if they have questions or technical difficulties (office doors will be kept open)
- Facilitators will monitor time (10 mins) and make sure people are finishing up after 8-9 minutes
- After everyone has completed the questionnaire, bring them back to the West Wing large conference room

Survey Contents

The following questions aim to explore your thoughts on climate change and the Arctic region. Please note that we are not interested in 'right' or 'wrong' answers! We are simply interested in what you think! Now please spend 10 minutes or so answering the following questions. Firstly, please write your participant number in the box:

How much do you know about each of the following topics¹?

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which one of the following statements best reflects your thoughts about climate change²?

- ☐ Climate change is not happening
- ☐ Climate change is happening and it is part of a natural cycle beyond human control
- ☐ Climate change is happening and it is mostly caused by humans
- ☐ Climate change is happening but I'm not sure what the main cause is
- ☐ I'm not sure whether climate change is happening or not

¹ Adapted from Hamilton (2016)

² Adapted from Hamilton (2016)

How much do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Climate change will not have a major impact on me and/or my household	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change impacts have been greatly exaggerated ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change is caused by the hole in the ozone layer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The actions of a single individual won't make any difference in climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I contribute to climate change when I heat/cool my home, and drive my car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To the best of your knowledge, which of the following best describes the Arctic region⁴?

- ☐ Mostly thin ice floating over a deep ocean
- ☐ Mostly thick ice over land
- ☐ A mainly rocky, mountainous landscape
- ☐ Don't know

Please list up to 3 species that live in the Arctic:

- ☐ 1 _____
- ☐ 2 _____
- ☐ 3 _____
- ☐ Don't know any species that live in the Arctic

³ Adapted from Dugan (2014)

⁴ Adapted from Hamilton (2016)

Please list 3 threats to the health of Arctic marine and sea-ice ecosystems:

☐ 1 _____

☐ 2 _____

☐ 3 _____

☐ Don't know any threats that affect the health of the Arctic ecosystem

Please list up to 3 ways in which you and others around you can help protect Arctic marine and sea-ice ecosystems

☐ 1 _____

☐ 2 _____

☐ 3 _____

☐ Don't know any ways in which people can help protect Arctic ecosystems

How important would you say it is to protect Arctic ecosystems? *Circle one only*

☐ Not at all Important

☐ Unimportant

☐ Neither Important nor Unimportant

☐ Important

☐ Extremely Important

Please indicate whether you have done any of the following in the past two weeks:

Check all that apply

☐ Actively looked for information about climate change

☐ Actively looked for information about the Arctic region

☐ Actively looked for ways in which to reduce carbon emissions

☐ Clicked on a news article/video/blog post about climate change

☐ Clicked on a news article/video/blog post about the Arctic region

☐ Clicked on a news article/video/blog post about ways to reduce carbon emissions

☐ Discussed the Arctic with a friend or family member

☐ Discussed climate change with a friend or family member

Now a few final questions about yourself.

Are you..?

☐ Female

☐ Male

☐ Other

☐ Prefer not to answer

What year were you born?

☐ 1996-1900

Do you consider yourself to be a Democrat, Republican, Independent or Other?

- ☐ Democrat
- ☐ Republican
- ☐ Independent
- ☐ Other

Are you a member of or have you donated to an environmental organization in the past year?

- ☐ Yes
- ☐ No

Have you ever been to the North Polar (Arctic) region?

- ☐ Yes
- ☐ No
- ☐ Don't know

If Yes: Where did you go, and when?

Thanks! Now please wait until everyone has finished completing the survey and then we will move back to the other room for the next exercise!

EXPERIMENTAL CONDITION: EcoChains Game (60 mins)

Large Conference Room

Instructions Video (10 mins)

If there is a problem with the video, read out the instructions from the pamphlet.

Second facilitator should organize the EcoChains card decks while video is playing.

Read Out During Video:

Beginning of Video: The video we are going to show you will introduce you to the game and give you instructions for gameplay. These are just the instructions, like the written instructions you have with other games. Once you begin playing the game, the rules will become clearer and we will be here to answer any questions and help out as you get started.

PAUSE: “Species Card Anatomy: Ice Copepod”

Look at your Ice Copepod card and identify the Species Group icon, the Prey icon, and the Sea Ice icon. [pause] How many Sea Ice cards are needed at the base of a food chain to support the Ice Copepod? [get response] Correct, one Sea Ice card is needed at the base of a food chain to support the Ice Copepod.

PAUSE: “Create your starting food webs”

Let’s make the same connections and build our starting food webs. First place your Krill feeding on your Phytoplankton. [pause] Then place your Ice Copepod feeding on your Ice Algae. [pause] You now have two food chains. Does either of them require Sea Ice? [pause for response] Yes, the Ice Algae and Ice Copepod both require one Sea Ice, so take one of your Sea Ice cards and place it at the base of that food chain.

PAUSE: (Ice Copepod & Squid Species cards)

Look at the two species cards on the screen and figure out where on your starting food chains you could place them. [pause for response] Right, the Ice Copepod would have to prey upon the Ice Algae, which it can do because all species can support up to two predators. Then the Squid would have three prey species that it could feed upon – two Ice Copepods and a Krill.

PAUSE: “Migration”

Look at your two food chains. What would happen if the Sea Ice beneath the Ice Algae melted? What would happen to the Ice Algae and the Ice Copepod? [pause for response] Yes, without Sea Ice the Ice Algae would migrate to the player on your left, and the Ice Copepod, without any Ice Algae to feed upon, would also migrate to the left.

End of Video: Any questions? (*Answer all questions as best as possible*)

Game Play (45 mins)

- Facilitators will circulate around the room to answer questions and point out when the game is not being played correctly (“hands-on facilitation”)
- Areas where rules are often unclear: ice dependency, dealing with events and actions, building food webs correctly, species migration within an ecosystem (takes up a turn), species migration between ecosystems rotate counterclockwise, only one chain per sea ice base
- If participants ask whether they will be tested on the game: *You will be completing similar activities after the game as you did before it. They are not tests and there are no right or wrong answers. We are just interested in what you think.*
- Cut gameplay off at 40 mins to allow time for players to tally their points

Group Discussion – Non-Facilitated (5 mins)

Read Out:

You now have a few minutes to discuss the game and your experience of the game amongst yourselves.

Facilitators leave the room, or occupy themselves with something else to encourage relaxed discussion. Do not record anything said.

CONTROL CONDITION: “Changes in the Far North” Article (20-25 mins)

Large Conference Room

Article Reading (15-20 mins)

- Facilitators give each participant a copy of the control article and instructions to read the article (they have 20 minutes so there is no need to rush)
- Facilitators can stand back (do not need to be active during the article reading)
- If participants ask whether they will be tested on the article: *You will be completing similar activities after reading the article as you did before reading it. They are not tests and there are no right or wrong answers. We are just interested in what you think.*

Group Discussion – Non-Facilitated (5 mins)

Read Out:

You now have a few minutes to discuss the article and your first impressions of it amongst yourselves.

Facilitators leave the room, or occupy themselves with something else to encourage relaxed discussion. Do not record anything said.

Post-Questionnaire (10 mins)

East Wing Offices

Facilitator Notes

- Qualtrics survey will already be pulled up on computers in East Wing offices
- Facilitators will stand in East Wing lobby to be accessible to participants if they have questions or technical difficulties (office doors will be kept open)
- Facilitators will monitor time (10 mins) and make sure people are finishing up after 8-9 minutes
- After everyone has completed the questionnaire, bring them back to the West Wing large conference room

Experimental Condition: Survey Contents

The following questions are designed to learn about your experience playing Ecochains. Please answer them to the best of your knowledge. Firstly, please write your participant number in the box:

Please list up to 3 species that live in the Arctic that you discovered by playing Ecochains:

☐ 1 _____

☐ 2 _____

☐ 3 _____

☐ Don't know / I didn't discover this information playing Ecochains

Please list 3 threats to the health of Arctic ecosystems that you discovered by playing Ecochains:

☐ 1 _____

☐ 2 _____

☐ 3 _____

☐ Don't know / I didn't discover this information playing Ecochains

Please list up to 3 ways in which you and others around you can help protect Arctic ecosystems that you discovered by playing Ecochains

☐ 1 _____

☐ 2 _____

☐ 3 _____

☐ Don't know / I didn't discover this information playing Ecochains

How much would you say you know about the following topics now, as a result of playing Ecochains⁵?

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

⁵ Adapted from Hamilton (2016)

How much would you say you knew about the following topics before playing Ecochains?

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you know about the following topics now, as a result of playing Ecochains:

	A great deal	A moderate amount	Only a little	Nothing at all
..events that might lead to organisms at the bottom of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..events that might lead to organisms at the top of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you knew about the following topics before playing Ecochains?

	A great deal	A moderate amount	Only a little	Nothing at all
..events that might lead to organisms at the bottom of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..events that might lead to organisms at the top of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you now know about the following topics as a result of playing Ecochains?

	A great deal	A moderate amount	Only a little	Nothing at all
..threats to the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which people can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which you can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you knew about the following topics before playing Ecochains?

	A great deal	A moderate amount	Only a little	Nothing at all
..threats to the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which people can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which you can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now I would like you to think about your experience playing Ecochains. What was the single most interesting or important thing you learned by playing this game?

Did this game raise any questions for you that were not answered?

- ☐ Yes
☐ No

If Yes: Please specify what questions were raised that were not answered:

Rate your agreement with the following:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
This game is fun to play	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This game is easy to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lost track of time as I play this game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I really got into the game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt like I just couldn't stop playing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This game maintained my interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel the rules of the game are easy to understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The main action of the game is useful for learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The game goals are clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The game is balanced with multiple ways to win	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a player, I felt in control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This game is unique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tended to be very competitive during this game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tended to be very cooperative during this game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The visuals of this game are good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please also indicate your agreement with the following:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Playing this game made feel emotionally connected to some of the species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made feel emotionally connected to my food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me think about the issues facing the Arctic region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me think about the impact of my actions on the Arctic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel guilty.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel afraid.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel hopeful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel angry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel aggressive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel happy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing this game made me feel a sense of power.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After playing Ecochains, how likely are you to...

	Not at all likely	Only a little likely	Somewhat Likely	Likely	Very Likely
Follow up in some way on any of the content or information provided?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommend the game to a friend or family member?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out more information about climate change?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out more information about the Arctic region?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out ways in which to reduce your carbon emissions?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How important would you now say it is to protect Arctic ecosystems? *Circle one only*

- ☐ Not at all Important
- ☐ Fairly Unimportant
- ☐ Neither Important nor Unimportant
- ☐ Quite Important
- ☐ Extremely Important

This is the end of the study. Thank you very much for your time! Please remember that we will be contacting you in about 4-week's-time via email to complete a 5-minute online follow-up questionnaire.

If you have any further comments, please use the space below:

Control Condition: Survey Contents

The following questions are designed to learn about your experience reading 'Changes in the Far North'. Please answer them to the best of your knowledge. Firstly, please write your participant number in the box:

Please list up to 3 species that live in the Arctic that you discovered by reading 'Changes in the Far North':

- ☐ 1 _____
- ☐ 2 _____
- ☐ 3 _____
- ☐ Don't know / I didn't discover this information from the article

Please list 3 threats to the health of Arctic ecosystems that you discovered by reading 'Changes in the Far North':

- ☐ 1 _____
- ☐ 2 _____
- ☐ 3 _____
- ☐ Don't know / I didn't discover this information from the article

Please list up to 3 ways in which you and others around you can help protect Arctic ecosystems that you discovered by reading 'Changes in the Far North':

- ☐ 1 _____
- ☐ 2 _____
- ☐ 3 _____
- ☐ Don't know / I didn't discover this information from the article

How much would you say you know about the following topics now, as a result of reading 'Changes in the Far North'⁶?

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

⁶ Adapted from Hamilton (2016)

How much would you say you knew about the following topics before reading 'Changes in the Far North'?

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you know about the following topics now, as a result of reading 'Changes in the Far North'?

	A great deal	A moderate amount	Only a little	Nothing at all
..events that might lead to organisms at the bottom of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..events that might lead to organisms at the top of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you knew about the following topics before reading 'Changes in the Far North'?

	A great deal	A moderate amount	Only a little	Nothing at all
..events that might lead to organisms at the bottom of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..events that might lead to organisms at the top of the Arctic food web being lost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you now know about the following topics as a result of reading 'Changes in the Far North'?

	A great deal	A moderate amount	Only a little	Nothing at all
..threats to the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which people can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which you can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would you say you knew about the following topics before reading 'Changes in the Far North'?

	A great deal	A moderate amount	Only a little	Nothing at all
..threats to the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which people can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
..ways in which you can help protect the Arctic ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now I would like you to think about the article 'Changes in the Far North'. What was the single most interesting or important thing you learned from reading this article?

Did this article raise any questions for you that were not answered?

- ☐ Yes
☐ No

If Yes: Please specify what questions were raised that were not answered:

Rate your agreement with the following:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
This article was fun to read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This article was easy to read	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lost track of time as I read this article	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I really got into the article	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt like I just couldn't stop reading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The article maintained my interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The visuals of this article were good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please also indicate your agreement with the following:

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Reading this article made feel emotionally connected to some of the species mentioned	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me think about the issues facing the Arctic region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me think about the impact of my actions on the Arctic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel guilty.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel afraid.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel hopeful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel angry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel aggressive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel happy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading this article made me feel a sense of power.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

After reading 'Changes in the Far North', how likely are you to...

	Not at all likely	Only a little likely	Somewhat Likely	Likely	Very Likely
Follow up in some way on any of the content or information provided?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommend the article to a friend or family member?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out more information about climate change?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out more information about the Arctic region?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek out ways in which to reduce your carbon emissions?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

This is the end of the study. Thank you very much for your time! Please remember that we will be contacting you in about 4 weeks-time via email to complete a 5-minute online follow-up questionnaire?

If you have any further comments, please use the space below:

Debrief Discussion (5 mins)

Large Conference Room

Experimental Condition

- DIFFERENT POWERPOINTS FOR EXPERIMENTAL AND CONTROL CONDITIONS: Either the “experimental” or “control” PowerPoint will be up on the projector
- Facilitators stand in front of the whole group to facilitate the debriefing discussion
- One facilitator reads out the debriefing questions, the other facilitator takes notes

Read Out Questions:

PPT slide: Some Questions about the Game

1. Was the game fun or interesting? If so, what did you think was fun or interesting about the game? If not, why not?
2. What was good about this game?
3. What was bad about this game?
4. Do you feel like you learned anything by playing this game? If so, what do you think you learned?
5. Was anything surprising?
6. Do you think your attitudes towards the Arctic may have changed by playing this game? Why or why not?

Control Condition

- DIFFERENT POWERPOINTS FOR EXPERIMENTAL AND CONTROL CONDITIONS: Either the “experimental” or “control” PowerPoint will be up on the projector
- Facilitators stand in front of the whole group to facilitate the debriefing discussion
- One facilitator reads out the debriefing questions, the other facilitator takes notes

Read Out Questions:

PPT slide: Some Questions about ‘Changes in the Far North’

1. Was the article fun or interesting to read? If so, what did you think was fun or interesting about it? If not, why not?
2. What was good about this article?
3. What was bad about this article?
4. Do you feel like you learned anything by reading this article? If so, what do you think you learned?
5. Was anything surprising?
6. Do you think your attitudes towards the Arctic may have changed from reading ‘Changes in the Far North’? Why or why not?

Conclusion (5 mins)

Large Conference Room

Extra Debrief

If extra debrief seems needed or appropriate.

Read Out:

The study is now complete. Thank you for participating! To give you a bit better of an understanding of this study: the PoLAR team has created different types of resources to communicate the same content as you [encountered while playing EcoChains / read in the 'Changes in the Far North' article] and the purpose of this study was to see how the different types of resources are received by audiences. We are running other study sessions that test the other resources. You will receive a more complete study debrief once you have completed the very brief online follow-up survey in 4 weeks.

NOTE: If participants ask about purchasing the game, we can note down their names/emails and send them an email once more information about game production/distribution becomes available.

Stipends and Follow-Up Survey

- Each participant receives an envelope with \$50
- Remind each participant about the follow-up survey in 4 weeks as they receive their stipends (when they will receive a more complete debrief about the study)

Facilitator Notes (Post-Study)

- Turn off all heaters and lights
- Put phone on "nite mode"
- Log off or shut down all computers
- Put participant consent forms, facilitator notes in cabinets in East Wing
- Lock office doors

EcoChains Follow Up Survey

Thanks for agreeing to complete this short survey! The purpose of the survey is to learn about your experiences since participating in the study. It should take about 5 minutes to complete.

Please indicate whether you have done any of the following since playing the EcoChains card game: (Check all that apply)

- ☐ Actively looked for information about climate change
- ☐ Actively looked for information about the Arctic region
- ☐ Actively looked for ways in which to reduce carbon emissions
- ☐ Actively looked for information about how to protect the Arctic region
- ☐ Clicked on a news article/video/blog post about climate change
- ☐ Clicked on a news article/video/blog post about the Arctic region
- ☐ Clicked on a news article/video/blog post about ways to reduce carbon emissions
- ☐ Discussed the Arctic with a friend or family member
- ☐ Discussed climate change with a friend or family member
- ☐ Discussed EcoChains with a friend or family member
- ☐ Followed up in some other way on any of the content or information provided by the game
- ☐ None of the above

Please describe the other way(s) in which you have followed up on any of the content or information:

For the following topics, indicate how much you know about each¹:

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which one of the following statements best reflects your thoughts about climate change²?

- ☐ Climate change is not happening
- ☐ Climate change is happening and it is part of a natural cycle beyond human control
- ☐ Climate change is happening and it is mostly caused by humans
- ☐ Climate change is happening but I'm not sure what the main cause is
- ☐ I'm not sure whether climate change is happening or not

¹ Adapted from Hamilton (2016)

² Adapted from Hamilton (2016)

How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Climate change will not have a major impact on me and/or my household	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change impacts have been greatly exaggerated ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change is caused by the hole in the ozone layer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The actions of a single individual won't make any difference to climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I contribute to climate change when I heat/cool my home, and drive my car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To the best of your knowledge, which of the following best describes the Arctic region⁴?

- ☐ Mostly thin ice floating over a deep ocean
- ☐ Mostly thick ice over land
- ☐ A mainly rocky, mountainous landscape
- ☐ Don't know

Please recall up to 3 species that live in the Arctic that you discovered by playing EcoChains:

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____
- ☐ Don't know / I didn't discover this information by playing EcoChains

Q10 We are interested in what you remember from EcoChains. Please only answer this question based on what you remember. Indicate whether the following species are associated with sea ice:

	Yes	No	Don't know
Phytoplankton	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic cod	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ringed seal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walrus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

³ Adapted from Dugan (2014)

⁴ Adapted from Hamilton (2016)

How important would you say it is to protect Arctic ecosystems?

- ☐ Not at all important
- ☐ Fairly unimportant
- ☐ Neither important nor unimportant
- ☐ Quite important
- ☐ Extremely important

If EcoChains were on the market for sale, would you be interested in buying a deck? Please indicate below the maximum amount that you would be willing to pay:

- ☐ I would not be interested to buy it
- ☐ \$10
- ☐ \$15
- ☐ \$20
- ☐ \$25
- ☐ More (specify) _____

If "I would not be interested to buy it" Is Selected

Can you tell me the reasons you would not be willing to buy a deck? (Check all that apply)

- ☐ I don't play games much
- ☐ I'd rather buy other games
- ☐ I'd rather spend my money on other things
- ☐ I didn't think the game was good enough to buy a deck
- ☐ I don't know people who play games
- ☐ I don't have time to play games
- ☐ I prefer to read about climate change or the Arctic than play a game about it
- ☐ Other (specify) _____

If you are interested in more information, please click on the following links. These pages will open up in new windows.

You must click SUBMIT SURVEY below in order for your response to be recorded.

<http://www.pewtrusts.org/en/projects/protecting-life-in-the-arctic>

http://wwf.panda.org/what_we_do/where_we_work/arctic/

<http://thepolarhub.org>

'Changes in the Far North' Follow Up Survey

Thanks for agreeing to complete this short survey! The purpose of the survey is to learn about your experiences since participating in the study. It should take about 5 minutes to complete.

Please indicate whether you have done any of the following since reading the article "Changes in the Far North": (Check all that apply)

- ☐ Actively looked for information about climate change
- ☐ Actively looked for information about the Arctic region
- ☐ Actively looked for ways in which to reduce carbon emissions
- ☐ Actively looked for information about how to protect the Arctic region
- ☐ Clicked on a news article/video/blog post about climate change
- ☐ Clicked on a news article/video/blog post about the Arctic region
- ☐ Clicked on a news article/video/blog post about ways to reduce carbon emissions
- ☐ Discussed the Arctic with a friend or family member
- ☐ Discussed climate change with a friend or family member
- ☐ Discussed the "Changes in the Far North"; article with a friend or family member
- ☐ Followed up in some other way on any of the content or information provided by the article
- ☐ None of the above

Please describe the other way(s) in which you have followed up on any of the content or information:

For the following topics, indicate how much you know about each⁵:

	A great deal	A moderate amount	Only a little	Nothing at all
Climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The North Polar (Arctic) Region	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food chains in general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Arctic food chains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which one of the following statements best reflects your thoughts about climate change⁶?

- ☐ Climate change is not happening
- ☐ Climate change is happening and it is part of a natural cycle beyond human control
- ☐ Climate change is happening and it is mostly caused by humans
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- ☐ I'm not sure whether climate change is happening or not

⁵ Adapted from Hamilton (2016)

⁶ Adapted from Hamilton (2016)

How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Climate change will not have a major impact on me and/or my household	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Climate change impacts have been greatly exaggerated ⁷	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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The actions of a single individual won't make any difference to climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I contribute to climate change when I heat/cool my home, and drive my car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

⁷ Adapted from Dugan (2014)

To the best of your knowledge, which of the following best describes the Arctic region⁸?

- ☐ Mostly thin ice floating over a deep ocean
- ☐ Mostly thick ice over land
- ☐ A mainly rocky, mountainous landscape
- ☐ Don't know

Please recall up to 3 species that live in the Arctic that you discovered by reading the "Changes in the Far North" article:

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____
- ☐ Don't know / I didn't discover this information by reading "Changes in the Far North"

We are interested in what you remember from the "Changes in the Far North" article. Please only answer this question based on what you remember. Indicate whether the following species are associated with sea ice:

	Yes	No	Don't know
Phytoplankton	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Ringed seal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walrus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How important would you say it is to protect Arctic ecosystems?

- ☐ Not at all important
- ☐ Fairly unimportant
- ☐ Neither important nor unimportant
- ☐ Quite important
- ☐ Extremely important

If you are interested in more information, please click on the following links. These pages will open up in new windows.

You must click SUBMIT SURVEY below in order for your response to be recorded.

<http://www.pewtrusts.org/en/projects/protecting-life-in-the-arctic>

http://wwf.panda.org/what_we_do/where_we_work/arctic/

<http://thepolarhub.org>

⁸ Adapted from Hamilton (2016)