

## ATTACHMENT C: COGNITIVE INTERVIEW PROTOCOL

# NSF Cognitive Interview Protocol

### Introduction

Thank you for coming in today. Have you been with us here before? Let me tell you a little about Westat and what we're going to do today.

Westat is a company that conducts research on many topics, for different organizations. This particular project is for the National Science Foundation. Westat has been asked to conduct a survey about what people know about science. For this survey thousands of people will be asked to complete a survey on the Internet. Before that happens though we like to test the questions out on people like yourself.

At this stage we are still developing the questionnaire and trying to figure out how to make it as easy as possible for people to understand and fill out correctly. So that is what you'll be helping us with.

### Informed Consent

Before we get started, I want to let you know that everything we cover in the interview will be kept private - only the few people actually working on the project will have access to the information you share with us. If there are any questions you don't want to answer that is perfectly fine - We're really more interested in how you interpret the questions.

If it's OK with you, I would like to tape our conversation, just so that I can review it later when we're analyzing all the interview data.

IF NEEDED: And finally, some of our colleagues from the National Science Foundation are here today - behind the mirror - to observe and see for themselves how the questions work.

Here is a form I must ask you to look over and sign - it basically covers the points I've just gone over with you and indicates you have agreed to take part.

**HAVE RESPONDENT SIGN INFORMED CONSENT. GIVE SECOND COPY TO RESPONDENT TO KEEP.**

### **[IF RESPONDENT AGREES TO RECORDING]**

I'm going to start the recorder. Today is \_\_\_\_\_. Now that the recorder is running, let me ask again: is it okay with you if I record this interview?

## Procedures

So let's move on. I'd like you to fill this out the best you can, but let me say a few things first. I'd like you to read aloud as you go along – just read the question and whatever your answer is. I'm going to be following along and filling in your answers on my copy. As much as possible, just read and respond to this the way you think you normally would if you were at home doing this on your own. Again, some people might read practically every word they see, while others might be inclined to skip stuff here and there – just do whatever feels right to you.

Please share whatever reactions come to mind while you're filling it out. At any time you should feel free to let me know if:

- there are words you don't understand, or
- the question doesn't make sense to you, or
- you could interpret it more than one way, or
- if the answer you are looking for is not provided.

Don't worry about criticizing the questions. I didn't write them so don't be concerned about hurting my feelings or anything like that.

Finally, we'll pause now and then to discuss something about a question.

For example I may ask you to explain your answer in more detail or I might ask questions such as:

- how did you come up with your answer, or
- how did you remember that, or
- what did it sound like the question meant to you?

These follow up questions may seem strange, but bear with me. They help me understand how well the questions are working. Do you have any questions before we begin?

## Section A.

**HAVE RESPONDENT COMPLETE ENTIRE SECTION BY READING ITEMS ALOUD AND ANSWERING. BEFORE MOVING ON TO NEXT SECTION, RETROSPECTIVELY PROBE ON THE FOLLOWING ITEMS.**

### True/False Versions of the Questions

**HALF OF THE RESPONDENTS WILL RECEIVE THE TRUE/FALSE VERSION.  
HALF OF THE RESPONDENTS WILL RECEIVE THE FORCED CHOICE VERSION.**

**Now, I would like to ask you a few short questions like those you might see on a television game show. For each statement that I read, please select true or false. If you don't know or aren't sure, select don't know and go to the next question.**

A1.

**1. First, the center of the Earth is very hot.**

- True
- False
- Don't know

A2.

**2. All radioactivity is man-made.**

- True
- False
- Don't know

A3.

**3. It is a chromosome from the father's genes that decides whether the baby is a boy or a girl.**

- True
- False
- Don't know

A4.

**4. Lasers work by focusing sound waves.**

- True
- False
- Don't know

**How did you come up with your answer? How certain are you of your answer?**

**IF DON'T KNOW, Could you take your best guess? How confident would you feel about your guess?**

A5.

**5. Electrons are smaller than atoms.**

- True
- False
- Don't know

A6.

**6. Antibiotics kill both viruses and bacteria.**

- True
- False
- Don't know

A7.

7. The universe began with a huge explosion.

- True
- False
- Don't know

How certain are you of your answer?

IF TRUE, How did you know this was true?

IF FALSE, Tell me more about why this is false. How would you rewrite this sentence so that it was true?

IF DON'T KNOW, Did you learn anything about this in school?

A7\_1.

8. The universe has been expanding for billions of years.

- True
- False
- Don't know

Tell me more about your answer. IF FALSE, Tell me what's wrong with this sentence.

IF DON'T KNOW, Did you learn anything about this in school?

**I'd like to show you another question that is similar. DISPLAY SHOWCARD 1.**

**SHOWCARD 1**

**The universe has been expanding ever since it began.**

- True**
- False**
- Don't know**

**In your opinion, are these two questions the same or different? What makes them the same/different? IF NEEDED, How would you answer this second question?**

A8.

**9. The continents on Earth have been moving for millions of years and will continue to move in the future.**

- True
- False
- Don't know

A9\_1.

**10. Mice descended from earlier species of animals.**

- True
- False
- Don't know

**In your own words, what is this question asking?**

**IF DON'T KNOW, Did you learn anything about this in school?**

**Could you take your best guess? How confident would you feel about your guess?**

A10.

**11. The Earth goes around the Sun.**

- True
- False
- Don't know



A9.

**12. Human beings descended from earlier species of animals.**

- True
- False
- Don't know

**In your own words, what is this question asking?**

**IF DON'T KNOW, Did you learn anything about this in school?  
Could you take your best guess? How confident would you feel about your guess?**

**IF FALSE, How would you reword this sentence so that it is true?**

**IF RESPONDENT ANSWERS FALSE TO THIS ITEM BUT TRUE TO Q10,  
Tell me more about why your answers to these two questions were different.**

**NOTE IF RESPONDENT REVISITS Q10 AFTER READING THIS ITEM.**

**AFTER COMPLETING PROBING FOR ENTIRE SECTION,  
What did you think of this series of questions?  
IF NEEDED, Were any terms difficult to understand?**

### Forced Choice Versions of the Questions

**HALF OF THE RESPONDENTS WILL RECEIVE THE TRUE/FALSE VERSION.**

**HALF OF THE RESPONDENTS WILL RECEIVE THE FORCED CHOICE VERSION.**

Now, I would like to ask you a few short questions like those you might see on a television game show. For each statement that I read, please select the best answer. If you don't know or aren't sure, select don't know and go to the next question.

AA1.

**1. First, is the center of the Earth very hot or is it not very hot?**

- Very Hot
- Not Very Hot
- Don't know

AA2.

**2. Is all radioactivity man-made or does some occur naturally?**

- All man-made
- Some natural
- Don't know

AA3.

**3. What decides whether a baby is a boy or a girl? Is it a chromosome from the father's genes, from the mother's genes, from both, or from neither?**

- Father's chromosome
- Mother's chromosome
- Both
- Neither
- Don't know

AA4\_1.

4. Do lasers work by focusing sound waves or do they work in some other way?

- Sound waves
- Some other way
- Don't know

**IF DON'T KNOW, Did you learn anything about this in school?  
Could you take your best guess? How confident would you feel about your guess?**

AA4.

**I'd like to show you another question that is similar. DISPLAY SHOWCARD 2.**

**SHOWCARD 2**

**Do lasers work by focusing sound waves, light waves, or do they work in some other way?**

- Sound waves
- Light waves
- Some other way
- Don't know

**How would you answer this second question?  
IF RESPONDENT ANSWERS "SOUND WAVES" TO FIRST AND "LIGHT WAVES" TO SECOND, Tell me more about why your answer changed.**

**Which version of the question do you prefer? Why?**

AA5.

**5. Are electrons smaller, larger, or the same size as atoms?**

- Smaller
- Larger
- The same size
- Don't know

AA6.

**6. Do antibiotics kill bacteria only, viruses only, or both viruses and bacteria?**

- Bacteria only
- Viruses only
- Both bacteria and viruses
- Don't know

AA7.

**7. Did the universe begin with a huge explosion or did it not begin this way?**

- With a huge explosion
- Did not begin this way
- Don't know

**How certain are you of your answer?**

**IF DID NOT BEGIN THIS WAY, How did the universe begin?**

**IF DON'T KNOW, Did you learn anything about this in school?**

**Could you take your best guess? How confident would you feel about your guess?**

AA7\_1

8. Has the universe been expanding, shrinking, or has it been pretty much the same size since it began?

- Expanding
- Shrinking
- Same size
- Don't know

**IF DON'T KNOW, Did you learn anything about this in school?  
Could you take your best guess? How confident would you feel about your guess?**

AA7\_2.

**I'd like to show you another question that is similar. DISPLAY SHOWCARD 3.**

**SHOWCARD 3**

**Has the universe been expanding, shrinking, or has it been pretty much the same size for billions of years?**

- Expanding
- Shrinking
- Same size
- Don't know

**In your opinion, are these two questions the same or different? What makes them the {same/different}? IF NEEDED, How would you answer this second question?**

AA8.

**9. Have the continents on Earth been moving for millions of years or have the continents pretty much stayed in place?**

- Moving
- Stayed in place
- Don't know

AA9\_1.

**10. Did mice descend from earlier species of animals or did they not descend from earlier species of animals?**

- Did descend from earlier species
- Did not descend from earlier species
- Don't know

**In your own words, what is this question asking?**

**IF DON'T KNOW, Did you learn anything about this in school?**

**Could you take your best guess? How confident would you feel about your guess?**

AA10.

**11. Now, does the Earth go around the Sun, or does the Sun go around the Earth?**

- Earth goes around the Sun
- Sun goes around the Earth
- Don't know

**IF DON'T KNOW, Did you learn anything about this in school?**

**Could you take your best guess? How confident would you feel about your guess?**

AA9.

**12. Did human beings descend from earlier species of animals or did they not descend from earlier species of animals?**

- Did descend from earlier species
- Did not descend from earlier species
- Don't know

**In your own words, what is this question asking?**

**IF DID NOT DESCEND, How did human beings appear on earth?  
IF RESPONDENT ANSWERS "DID NOT" TO THIS ITEM BUT "DID" TO Q10  
Tell me more about why your answers to these two questions were different.**

**IF DON'T KNOW, Did you learn anything about this in school?  
Could you take your best guess? How confident would you feel about your guess?**

**NOTE IF RESPONDENT REVISITS Q10 AFTER READING THIS ITEM.**

**AFTER COMPLETING PROBING FOR ENTIRE SECTION,  
What did you think of this series of questions?  
IF NEEDED, Were any terms difficult to understand?**

## Section B.

HAVE RESPONDENT COMPLETE ENTIRE SECTION BY READING ITEMS ALOUD AND ANSWERING. BEFORE MOVING ON TO NEXT SECTION, RETROSPECTIVELY PROBE ON THE FOLLOWING ITEMS.

The next questions are not about what you think, but are about what most scientists think. Please tell us whether each of the following is True or False according to modern biology.

In your own words, who are “most scientists”? Do you feel you know what “most scientists” think? IF YES, Tell me more about how you know.

To you, what is “modern biology”?

According to modern biology...	True	False	Modern biology doesn't say
A. Individual members of a species are equally able to find food and reproduce.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

According to modern biology...	True	False	Modern biology doesn't say
B. Even species that look different such as cats and worms can be similar genetically.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your own words, what is this saying?

How did you decide on your answer? How confident of your answer are you?



According to modern biology...	True	False	Modern biology doesn't say
C. Some bacteria may inherit a gene that helps them survive the effects of drugs. These bacteria will be more likely to live when exposed to the drugs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

According to modern biology...	True	False	Modern biology doesn't say
D. All plants and animals, including humans, share a common ancestor that lived a long time ago.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What does “common ancestor” mean to you?**

**Tell me more about your answer. IF FALSE, Tell me what's wrong with this statement.**

**IF FALSE, Let's say this question asked whether the following was true or false according to the theory of evolution. How would you answer?  
IF DIFFERENT, Why is your answer different?**

According to modern biology...	True	False	Modern biology doesn't say
E. Physical characteristics such as big muscles that an animal acquires during its lifetime will be passed on to its offspring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**In your own words, what is this saying?**

**What does it mean for a characteristic to be acquired during the lifetime of an organism? Can you give me an example?**

According to modern biology...	True	False	Modern biology doesn't say
F. People of some races have better genetic traits than people of other races.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**In your own words, what is this saying? IF NEEDED, What does it mean by “better genetic traits”? Can you give an example?**

**How did you decide on your answer?**

According to modern biology...	True	False	Modern biology doesn't say
G. Evolution means that all species are slowly evolving towards perfection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Are you familiar with the theory of evolution? IF YES, In your own words, what is the theory of evolution?**

**How did you decide on your answer?**

**In your own words, what does “slowly evolving toward perfection” mean? Can you give an example?**

According to modern biology...	True	False	Modern biology doesn't say
H. All dogs and cats share a common ancestor that lived a long time ago.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IF FALSE AT D AND TRUE AT H, Tell me more about your answer.  
IF NEEDED, Tell me about the differences between item D and this one.**

According to modern biology...	True	False	Modern biology doesn't say
I. During their lifetimes, plants develop traits like growing toward the sun that they need in order to live.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Tell me more about your answer.**

**What does it mean to “develop traits during their lifetimes”? Can you give me an example?**

According to modern biology...	True	False	Modern biology doesn't say
J. When a predator is introduced into a population of lizards, the lizards with traits that help them avoid the predator are more likely to survive and reproduce than the others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

According to modern biology...	True	False	Modern biology doesn't say
K. Pigeons and frogs share a common ancestor that lived a long time ago.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IF FALSE, Let's say this question asked whether the following was true or false according to the theory of evolution. How would you answer? IF DIFFERENT, Why is your answer different?**

According to modern biology...	True	False	Modern biology doesn't say
L. A population of birds that lives in two different places may slowly adapt to those places and over many generations become two different species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IF FALSE, Let's say this question asked whether the following was true or false according to the theory of evolution. How would you answer?  
IF DIFFERENT, Why is your answer different?**

According to modern biology...	True	False	Modern biology doesn't say
M. People's fates are determined by their genes and not by free will.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Tell me more about your answer.**

**What does it mean to say "people's fates are determined by their genes"?**

**AFTER COMPLETING PROBING FOR ENTIRE SECTION,  
What did you think of this series of questions?  
IF NEEDED, Were any terms difficult to understand?**

**FOR ALL ITEMS WHERE RESPONDENT ANSWERED 'BIOLOGY DOESN'T SAY,'  
Tell me more about your answer here.  
DETERMINE IF RESPONDENT IS USING THIS CATEGORY AS "DON'T KNOW."**

**ASK RESPONDENTS TO COMPARE D, H, AND K.  
These questions all ask about a common ancestor.  
To you, are these questions asking the same thing or different things?  
IF DIFFERENT, What is different about these questions?**

## Section C.

HAVE RESPONDENT COMPLETE ENTIRE SECTION BY READING ITEMS ALOUD AND ANSWERING. BEFORE MOVING ON TO NEXT SECTION, RETROSPECTIVELY PROBE ON THE FOLLOWING ITEMS.

C1

2. For the following items, please indicate your agreement/disagreement with the given statements using the following scale:

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
N. The modern theory of evolution is just speculation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Are you familiar with the theory of evolution?**

**IF YES, What do you about the theory of evolution? IF NEEDED, Where did you learn about it?**

**What does “speculation” mean?**

**IF AGREE OR STRONGLY AGREE, Tell me more about your answer. How do you know it is based on speculation?**

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
O. Strong scientific evidence shows that evolution has actually occurred.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What is “scientific evidence”?**

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
P. The earth is less than 10,000 years old.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Tell me more about your answer. Where did you learn about the age of the earth?**

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Q. Mice today are basically the same as mice have always been.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
R. The Earth is at least 4 billion years old.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
S. The modern theory of evolution cannot be correct because it disagrees with what the Bible says.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Are you familiar with the Bible's account of creation? Can you briefly describe it? How did you learn about it?**



	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
T. Humans exist today in the same form they always have	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
U. Most scientists doubt whether evolution occurs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Tell me more about your answer.**

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
V. Over time, many new types of plants and animals have come into existence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C2.

**13. Do you, personally, think that the theory of evolution is correct, do you think it is incorrect, or don't you have an opinion either way?**

- Think the theory of evolution is correct
- Think the theory of evolution is incorrect → **GO TO QUESTION 4**
- Don't have an opinion → **GO TO QUESTION 5**

C2A.

**14. Why do you think the modern theory of evolution is correct?**

**15. Why do you think the modern theory of evolution is incorrect?**

**PROBE ON RESPONDENT'S EXPLANATION.**

C3.

**16. How much evidence do you think supports the modern theory of evolution?**

- Overwhelming evidence
- A lot of evidence
- Some evidence
- A little evidence
- No evidence

**Tell me what you know about the theory of evolution. How did you learn about it?**

C5.

**17. Does the modern theory of evolution claim that human beings are just another species of animal with nothing really special about them?**

- Yes
- No

**What is this question asking? IF NEEDED, What does “just another species of animal” mean exactly?**

**Tell me more about your answer.**

**How easy or difficult was it to answer this question? What made it {easy/difficult}?**

C7.

**18. Does the theory of evolution lead children to believe that there is no God or does it not lead to this belief?**

- Does lead to this belief
- Does not lead to this belief

**What is this question asking about?**

**How easy or difficult was it to answer this question? What made it {easy/difficult}?**

C9.

**19. How much does the theory of evolution conflict with a belief in morality?**

- Not at all
- A little
- Some
- A lot
- Completely

**What is this question asking about? IF NEEDED, What is morality?**

**Tell me more about your answer.**

## Closing and Incentive

**IF OBSERVERS ARE PRESENT, CHECK TO SEE IF THEY HAVE FURTHER QUESTIONS.**

That is all the questions I have for you.

**Is there anything we haven't discussed that you would like to mention?  
DISCUSS ANY RESPONDENT COMMENTS.**

Thank you for your time.

STOP TAPE RECORDER.

GIVE INCENTIVE AND HAVE RESPONDENT SIGN RECEIPT.