

How is a human like a banana? Conceptions of humans as part of the natural world



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Abstract

In a study of 8-to-15-year-old visitors ($N = 250$) to two large natural history museums, we investigated the broader implications of visitors' conception of "human as animal." Professional biologists include humans in the "tree of life", which also includes less visible members of the living world: plants, fungi, and microscopic organisms. Are youth who acknowledge this common ancestry more likely to feel part of the natural world? Results suggest that youth who indicated that humans share a common ancestor with other species were better informed regarding core evolutionary concepts and were more likely to feel related to all life on Earth.

Introduction

Humans share ancestry with all other species on Earth. This conception has important implications for our health, the environment, and, indeed, for the survival of life on Earth. Yet, the idea that humans are essentially different from other animals is found worldwide (Atran, Median, & Ross, 2004). Further, in monotheistic religions humans are accorded a privileged spiritual status that sets them apart from the natural world (Evans, 2001). In the US, fewer adults accept the idea that humans evolved than the idea that other animals evolved (NCSE, 2010). Whether or not humans are included in the animate world is also coded linguistically; preschoolers have difficulty grasping the polysemous term "animal" (Hermann, Medin, & Waxman, 2012) and younger elementary-school children are less likely than older children to conceive of the human as an animal (Evans, 2008). In the current study, we investigated a broader network of ideas about biological change and relationships that might support the concept of "human as animal" and challenge essentialistic views of human exclusivity.

Method

Participants

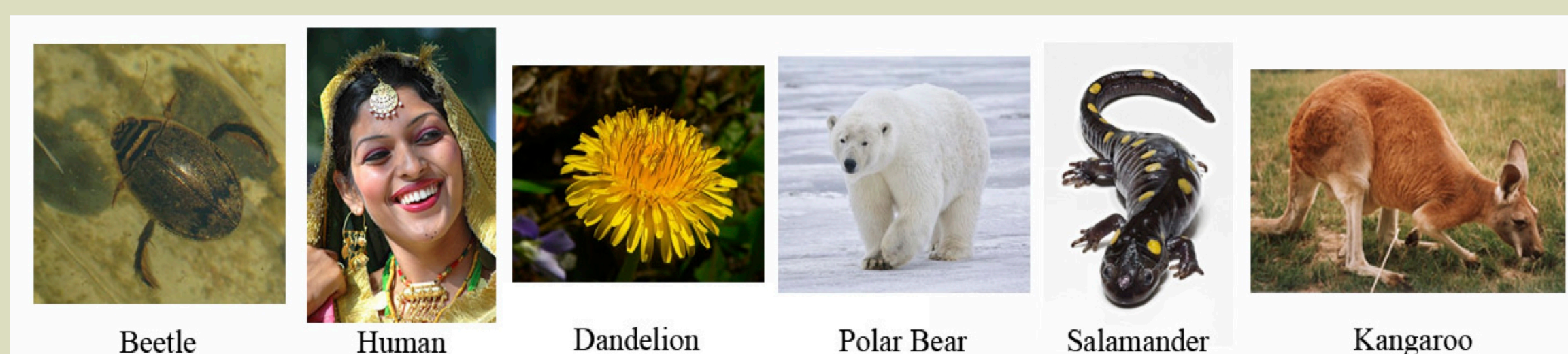
- $N=250$, 9-15 year-olds ($M=11.56$, $SD=1.68$; 126 females) recruited from the Field Museum Chicago and the Harvard Museum of Natural History. They were divided into two age-groups: 8-11 year-olds ($N=113$) and 12-15 year-olds ($N=135$)
- Ethnicity: Caucasian 72%, Asian Americans 11%, Hispanic or Latino 10%, African Americans 4%, Other (e.g., Asian, Indian) 3%.
- Parents' Education: (16 yrs = 4 yr college degree) $M=16.69$ yrs, $SD=2.21$ yrs

Procedure

Participants were recruited to take part in a study examining the effectiveness of a multi-touch, digital exhibit designed to convey core evolutionary concepts (see Evans et al., 2013, SRCD). Youth completed a 20 minute interview with the experimenter during which time they were asked about evolutionary concepts. Parents completed a demographic questionnaire.

Measures

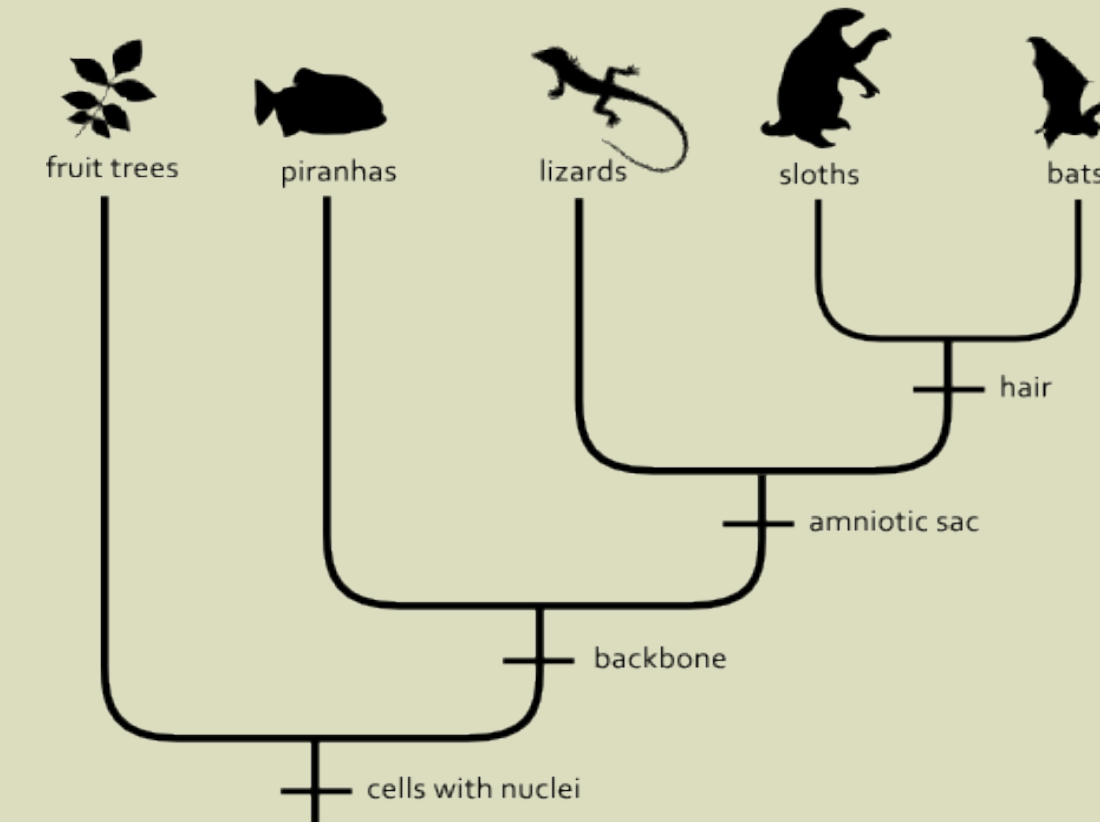
- (M1) Common Ancestry (Sample Questions) (5 point scale: 1=Disagree, 5=Agree)
- CA Q1: "Some kids said that ALL these living things had the same ancestor a long, long time ago. Do you agree or disagree with them?"



- CA Q2: "Some kids said that HUMANS and MUSHROOMS had the same ancestor a long, long time ago. Do you agree or disagree with them?"

► (M2) Interpreting a Tree of Life Diagram (Sample Questions)

- TL Q1: "Point to the living things that have a backbone."
- TL Q2: "Do you think that humans belong in this picture?"



► (M3) Evolution as an Ongoing Process (Sample Questions) (5 point scale: 1=Disagree, 5=Agree)

- Some kids said that CARDINALS, a type of bird, are changing over time and might be VERY different millions of years in the future. Do you agree or disagree?
- Some kids said that HUMAN BEINGS, a type of primate, are changing over time and might be VERY different millions of years in the future. Do you agree or disagree?

► (M4) Assessing Biological Change (Sample Scenario) (5 point scale: 1=Disagree, 5=Agree)



Scientists found lizards on these islands. Some were *really* colorful but you could hardly see them in the colorful rocks. Some were just brown and they were easy to see in the colorful rocks -- but very hard to see on the sand. Seabirds eat lizards that are easy to see. Scientists came back years later and all the colorful rocks had been washed away by storms and it was mostly brownish sand. They found that the lizards were mostly brown-colored.

- I asked some other kids: How did it happen that there were so many brown-colored lizards on the sandy shores of the island? Some kids said It's the result of evolution. Do you agree or disagree?

► (M5) Feeling Related to All Life on Earth (5 point scale: 1=Disagree, 5=Agree)

- I am going to make a statement about something that YOU may feel about living things and you tell me whether you agree or disagree with what I have said:

1. "I feel like I'm different from all other living things on Earth." (reverse scored)
2. "I feel like I'm related to all life on Earth."
3. "I feel like I am separate from the rest of life on Earth." (reverse scored)

Results

Common Ancestry Q1: Participants who acknowledged that distally related species shared an ancestor a long time ago on Common Ancestry Question 1 (31%) were significantly more likely than those who did not to: (M2 Q1) agree that humans belonged in the tree of life, (M2 Q2) accurately interpret a tree of life diagram, (M3) acknowledge that evolution is an ongoing process, (M4) grasp an understanding of biological change, and (M5) feel that they are related to all life on Earth (See Figures 1 & 2).

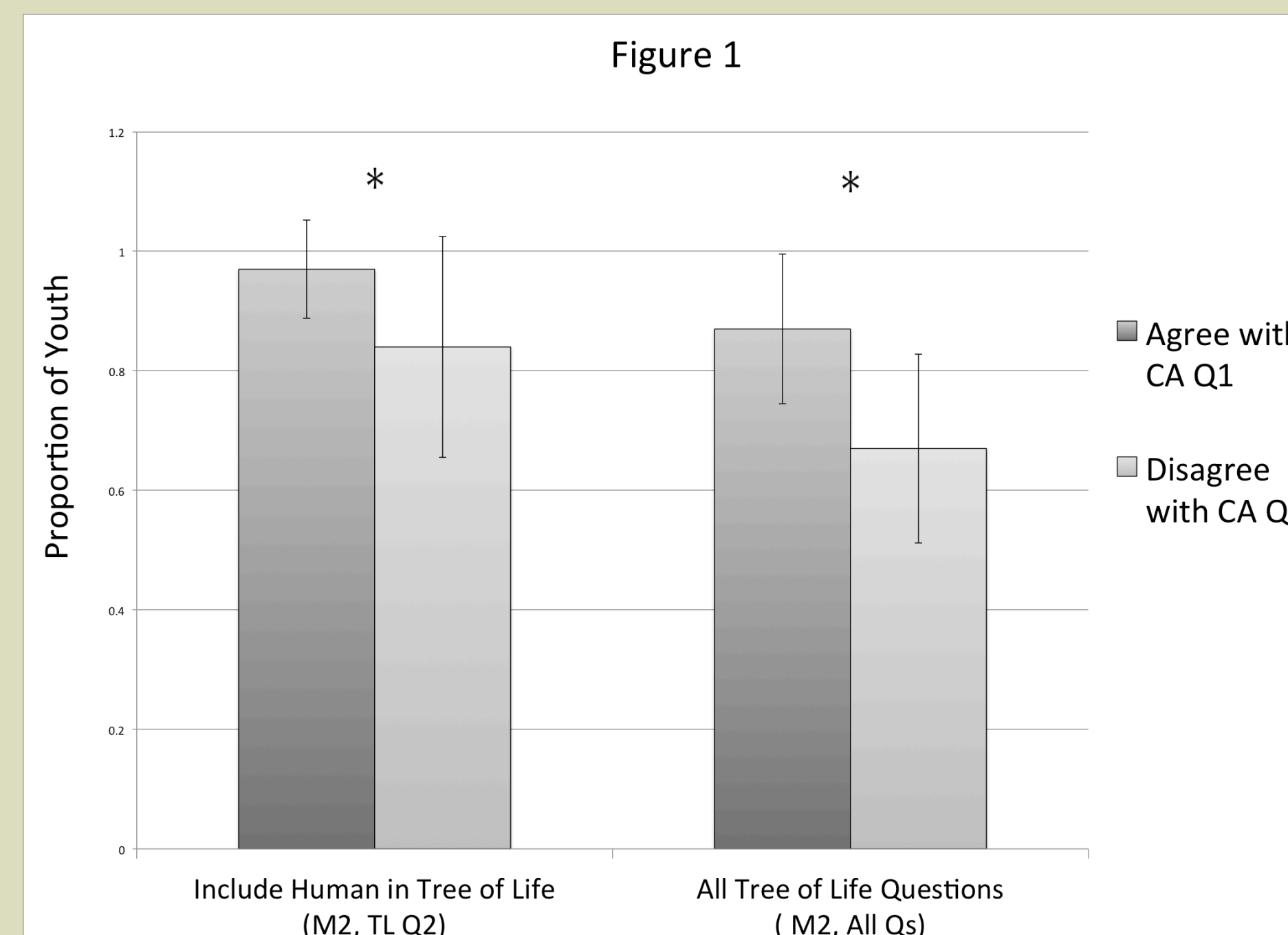


Figure 1. Proportion of youth who answered the tree of life questions correctly as a function of their agreement with CA Q1 (that distally related species, including humans, share a common ancestor). * $ps < .001$, two-tailed.

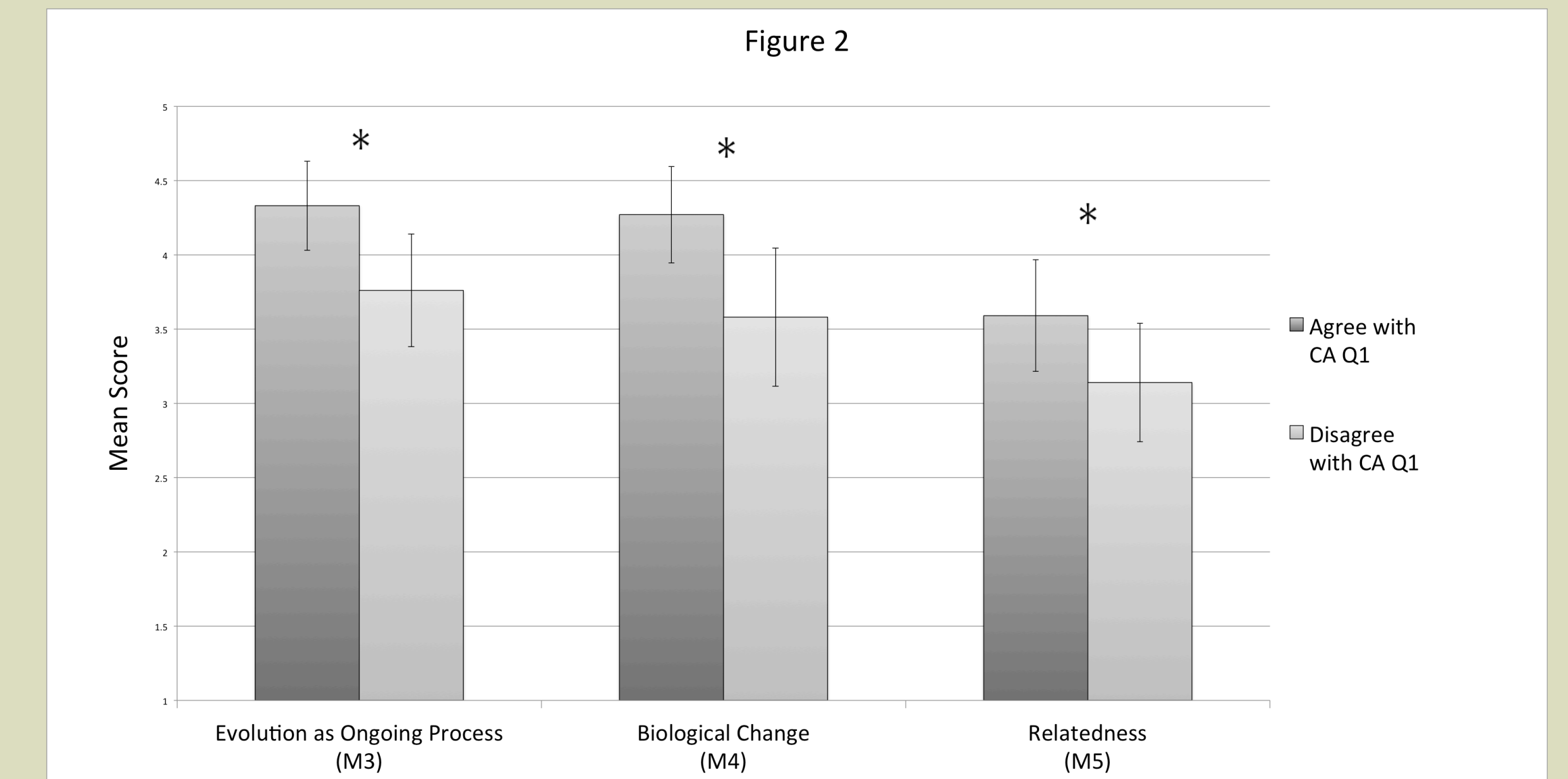


Figure 2. Participants' mean scores as a function of their agreement with Common Ancestry-Q1 (that distally related species, including humans, share an ancestor in common). * $ps \leq .001$, two-tailed.

Effects of Age: Youth aged 12 years or older were significantly more likely than their younger counterparts to endorse agree or strongly agree with both Common Ancestry Questions 1 and 2.

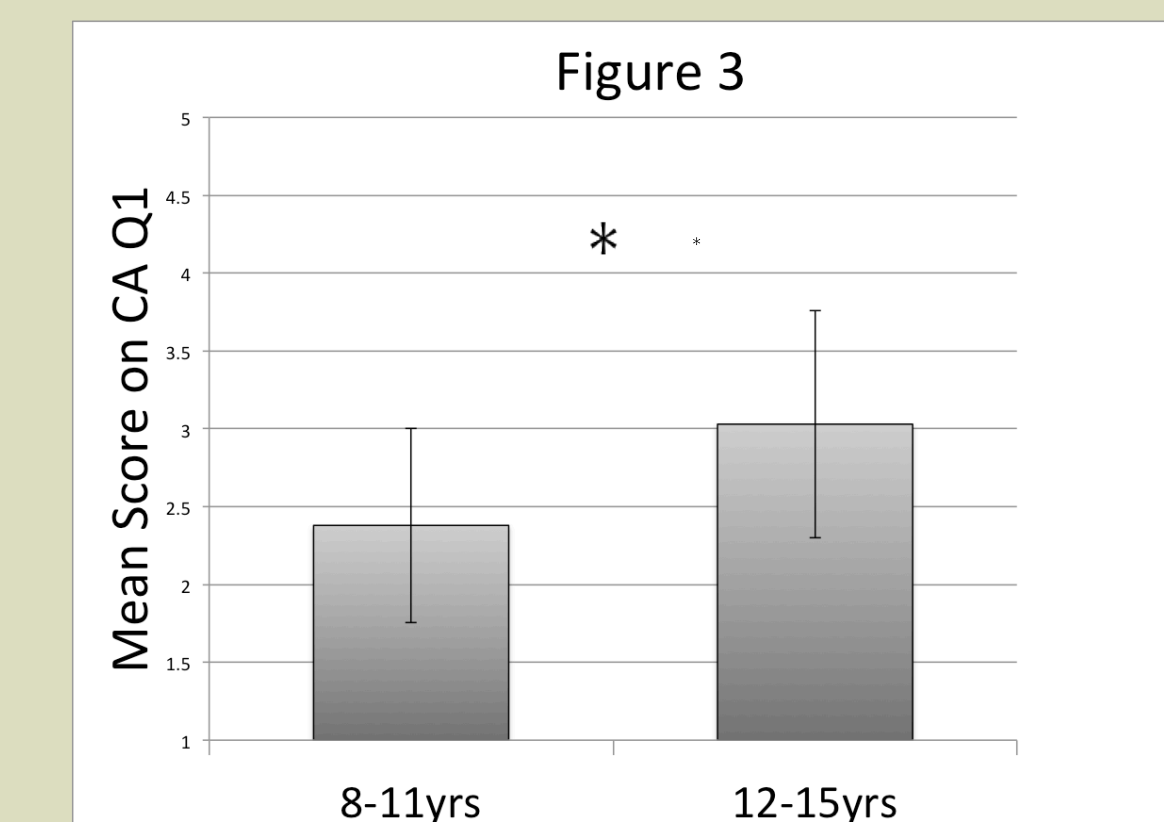


Figure 3. Mean scores on Common Ancestry Q1 (distally related species, including humans, share an ancestor in common). * $p < .001$, two-tailed.

Common Ancestry Q2: When asked about humans shared ancestry with mushrooms, 19%, only, were in agreement; yet, the same overall pattern of results with variables 1-through-5 was obtained.

Regression Analysis

To assess their joint and unique effects, all measures were simultaneously regressed on the Common Ancestry Q1 Scale (1-5). The analysis revealed that age did not account for variance independently of the other measures: Jointly these measures accounted for 26% ($R = .511$) of the total variance ($p < .001$) with (M2, Q2) Tree of Life Questions, (M3) Evolution is Ongoing, (M4) Biological Change, and (M5) The Feeling of Relatedness all explaining variance independently of each other ($ps = .037$ to $< .001$).

Discussion

An understanding of humans' biological heritage with all living things appears to have important implications for the acquisition of evolutionary concepts: Independently of age, early- to mid-adolescents who agree that humans share ancestors with distally related species are better able to interpret a tree of life diagram and are more likely to see evolution as an ongoing process that results in biological change. Moreover, adolescents who acknowledge this shared history are more likely to "feel" as if they are part of the natural world. Future research will focus on the cognitive and social factors that contribute to youth's connectedness with the natural world with the goal of fostering their active role in conservation efforts. This research strongly suggests that a grasp of evolutionary concepts is key to this understanding. Further analyses will also address whether parental demographic variables (e.g., education, the compatibility of scientific and religious beliefs) contribute to children's understanding of evolutionary concepts.

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For more information on this research project, visit www.lifeonearth.seas.harvard.edu.

