

Dinosaur Communication Demo Formative Evaluation COSI Labs in Life Language Pod

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Background

The Language Pod is part of the Labs in Life in COSI's Life exhibit. It serves as a research space for professors and students at The Ohio State University working in the field of linguistics, and allows COSI visitors to participate in and observe real scientific research. The Language Pod also develops and operates program carts on linguistic concepts for COSI visitors in the main hall outside the Life exhibit. The cart demos are run by Ohio State students as part of a course at the university and explore a wide range of linguistic concepts.

Program carts consist of short, educator-facilitated activities on mobile carts and are conducted outside of the main exhibit spaces. They are regularly operated throughout the halls of COSI by the Labs in Life, as well as COSI staff and volunteers. They can be conducted anywhere in the museum and they are operated for typically 30 minutes to two hours at a time, as they require a demonstrator to facilitate the activity and explain concepts to visitors. Visitors chose whether to engage in the experience or not as they walk through the museum. In some cases they stop at the cart with the intention of engaging in the specific program cart experience, in others something about the demo catches their attention and they come over to explore it.

Dinosaur Communication Demo

Dinosaur Communication is a new cart demo developed for the Language Pod that explores the communication strategies, abilities, and limitations of dinosaurs through roleplaying with toy dinosaurs.

Communication is the process of transmitting signals with a known meaning, and while humans have the unique ability to transmit very complex signals through language, other animals have more limited forms of communication. These can include sounds, movements, body posture, actions, scents, and more, all used for different communicative functions such as threatening, defense, mate competition, and group identification.

Dinosaurs are a great way to demonstrate these communicative functions, as they are very familiar to people and their diversity allows for the representation of a wide range of functions. Visitors can engage in roleplaying scenarios that allow them to use their imagination and think about these communication strategies in action. The demo shows that even though they didn't have language, dinosaurs had their own useful ways of communicating that were likely similar to animals today.

The learning objectives of the demo include:

- **Main objective:** Communication is something that all animals do, and it is not the same as language.
- Animals communicate through physical traits such as coloring, ornamentation, and imposing features, as well as other methods such as vocalization and behavior. These different features allow them to say a lot without language.

- They communicate about such things as threats, mate competition, group identification, and defense. These functions are evolutionarily significant and thus all animals have developed ways to communicate them.
- Many of the communication methods we believe the dinosaurs used are based on the way we observe modern animals communicating. Because they face similar demands, animals respond to communicative tasks in similar ways. We can also observe these communication methods in modern animals too.

The demo is conducted using a program cart. Visitors choose from four dinosaurs, a Tyrannosaurus rex, a triceratops, a stegosaurus, and a parasaurolophus, one that they would like to learn about. After choosing a dinosaur, the demonstrator gives them a scenario in which they must communicate as their dinosaur. These scenarios are related to different common animal communicative functions. Visitors are encouraged to play with the dinosaurs to help them think about how they might communicate.



The **T. rex** teaches about defense and threat behavior through a scenario in which the visitor's T. rex must defend its prey from another T. rex.



The **triceratops** teaches about mate competition and sexual selection through a scenario in which visitor's triceratops must show off to another triceratops



The **stegosaurus** teaches about defense mechanisms through a scenario in which visitors must decide whether a predator would eat their stegosaurs or another dinosaur without a defense mechanism like the stegosaurus's plates.



The **parasaurolophus** teaches about group identification through a scenario where visitors must determine which among a group of other dinosaurs belongs to the same group as their parasaurolophus.



Evaluation

Objectives

The objective of this evaluation was to understand visitors' reactions and learning outcomes regarding Dinosaur Communication and to utilize that information in the further development of the demo.

This evaluation aimed to observe and understand:

- Whether visitors understood how to complete the activity
- How visitors physically interacted with the activity
- Whether the activity difficulty and length were appropriate for COSI visitors
- Whether visitors found the activity enjoyable
- Whether the intended educational message of the demo was coming across

Methodology

This evaluation consisted of a brief verbal questionnaire conducted with visitors after completing the demo, as well as the taking of observational notes on visitor demographics and activity experiences by the demonstrator after each trial. The questionnaire was given to the group as a whole, thus each response reflects the experience of the collective group, regardless of size or makeup. All demos and questionnaires were conducted by the author.

The demo was done on a program cart, and the evaluation questionnaire was conducted at the cart immediately after the completion of the activity. The cart was located in the hallway outside of the Life exhibit and operated during regular COSI hours on weekends. The evaluations were conducted once a week from January 2018-February 2018.

Participants were recruited when they came over to try out the demo. Before the demonstrator began, they told the visitors that the demo was currently in development and asked if they would be willing to answer a few brief questions when they had completed it to help further improve the experience. They were told that if they did not want to answer any questions, or wanted to stop answering questions at any point, they were allowed to do so. If visitors agreed to be surveyed they were asked the questions verbally and the demonstrator recorded their answers. The demonstrator also made observational notes on the experience. If visitors declined to be surveyed, the demo was still conducted but no questions were asked, though the demonstrator made notes reflecting on the experience. The demonstrator never referred to herself as the creator of the activity and described the demo as though she was testing it for the Language pod to avoid influencing visitor's responses.

The questionnaire gathered demographic information including number of visitors doing the demo (the demo was almost always done by a single group of visitors who had come to the museum together, e.g. a family, a couple), the ages of the visitors in the group, and the group's relationship to one another. This information was gathered/estimated observationally by the

demonstrator and was not specifically asked of the visitors. It was collected to determine whether the activity was effective for different ages and group makeups. Activity related information was also recorded in order to determine visitors' ability to do the activity and interest in continuing with it. The post-activity visitor questionnaire consisted of four open-ended questions. They were meant to assess visitor's enjoyment of and ability to complete the activity, as well as whether the learning objectives of the demo were coming across as intended. After completing the demo and, if conducted, the questionnaire, the demonstrator answered a series of nine questions reflecting on the experience. They recorded the logistics of the demo, if and how visitors completed the activity, and the level of engagement groups of visitors had with one another.

Results

The following results come from 53 trials of the Mayan Glyphs demo. Demonstrator notes were taken for each trial. Visitors agreed to and questionnaires were conducted for 38 of the trials.

General

Overall, participants were very successful at completing the activity. With the exception of five instances in which participants lost interest and stopped doing the activity part way through, they were able to complete the activity by themselves or with some assistance.



All participants who completed the activity completed at least one dinosaur scenario. For those that did the activity in groups of 3-4 people, 3-4 of the scenarios were completed so they were not able to do more. Those in groups of 1-2, though, were asked if they would like to choose another scenario and continue the activity. The majority of eligible participants did not choose to continue, however, a significant number of them did choose to.



A range of different groups, from individuals to families, did the Dinosaur Communication demo. Visitor ages concentrated around younger and older elementary, though data was collected on the activity from a range of ages. Overall, younger and older elementary visitors (roughly ages 5-10) were shown to be to be the primary audience for the cart, and ultimately provided the bulk of the feedback for the questionnaire.



Participant Post-Activity Questionnaire

Participant's favorite parts of the activity tended to vary by personal ability or interest, but the information was collected to see what aspects of the activity were enjoyable and which if any, should be expanded upon to promote greater enjoyability and engagement. The chance to play with the dinosaur toys proved to be an enjoyable factor for younger participants, as well as some older participants who expressed that they got to "feel like a kid again." Some participants enjoyed that the dinosaurs offered a visual example of these processes, which demonstrated that of this demo's intention of presenting the communication strategies through interaction had been successful. The most common favorite part of the activity was learning something new, which, while a vague answer, may also show that they did not already know the things this demo aimed to teach. Other visitors stated a specific dinosaur as their favorite part of the activity, and the T. rex and Parasaurolophus proved to be the most enjoyed scenarios, which the Triceratops was the least enjoyed.



The following terms were used to group and code open-ended responses:

- **Playing** playing with the toy dinosaurs
- Choosing picking a dinosaur to learn about
- Questions figuring out how the dinosaurs would have communicated
- Learning learning something new
- Tangibility having the toys as a concrete visual model
- Specific Dinosaur liked one of the specific dinosaur examples best
- All enjoyed the entire demo or the demo as a whole

Participant's least favorite parts of the activity were recorded to determine whether some parts of the activity were not enjoyable or difficult to the point of becoming an obstacle to engagement. Some visitors did not enjoy the questions, typically because they felt they were difficult and struggled to answer them. The T. rex was most commonly cited as a least favorite part of the activity among specific dinosaurs, in all three cases because the scenario involved the T.rex eating another dinosaur. In the majority of questionnaires, visitors did not cite a least favorite aspect of the activity or simply said that they enjoyed it in its entirety. This may have been a result of them enjoying the activity, or it may have been an unwillingness to criticize it.



The following terms were used to group and code open-ended responses:

- Choosing picking a dinosaur to learn about
- Answers not being able to figure out how the dinosaurs would have communicated
- Specific Dinosaur liked one of the specific dinosaur examples least
- None had no least favorite part of the activity

Visitors were asked in the questionnaire what they felt the demo was trying to get them to learn. The most common response by a large margin was that it taught how dinosaurs communicated. While this was most obviously what the activity was about and an aspect of the message, it was not the core learning outcome of the demo. Responses within the much smaller "animal communication," "different than humans," and "other communication methods" categories were more in line with the core message that animals communicate, and they do so in a way that is different from humans.



The following terms were used to group and code open-ended responses:

- **Dinosaur Communication** how dinosaurs communicated
- Animal Communication how animals communicate (exemplified by these dinosaurs)
- **Communication Strategy** a specific strategy animals use to communicate (e.g., defense mechanisms, parasaurolophus crest sounds, display)
- Dinosaur Facts general facts about dinosaurs
- Different than Humans animals/dinosaurs communicate differently than humans
- Other Communication Methods there are ways to communicate that are not words

Demonstrator Reflection Questionnaire

With multiple scenarios and open-ended prompts, this activity provided a great opportunity for participants to interact and work together with other members of their group. This was encouraged by having group members all choose a dinosaur at the beginning, and then having them work together to figure out the communication method in each scenario one by one. Ultimately, groups interacted at different levels (ordered in the table below from highest to lowest depth of interaction). Most groups worked together to figure out the communication strategies, bouncing ideas off one another and all contributing. Parent support was also common, as many parents prompted their children to answer questions, but did not actively play with them or try and figure out the communication strategy. Discussion involved participants reflecting on or recounting what they had learned, and the number of groups who engaged in it is encouraging.



*number of participants who participated in a group of 2 or more

The following terms were used to group and code open-ended responses:

- Discussion discussed what they had learned with one another after completing the activity
- Answered Questions worked together to figure out the communication strategies
- Played played together with the dinosaur toys
- Survey participants did not actively participate together, but they did answer questions about the demo together
- **Parent Support** parents encouraged or prompted children to answer questions, but did not actively participate in the activity or answer questions with them
- None participants did not interact with each other in the activity

Interpretation and Application of Results

The results of this evaluation helped to develop a better understanding of how visitors related to the Dinosaur Communication demo and what they learned from it. Overall, the results largely confirmed the logistical efficacy of the demo. They also present implications for the future operation of the demo, as well as how the lesson may be integrated into other demos.

Both the participant and evaluator questionnaire sought to evaluate whether the demo worked from a practical standpoint, including whether visitors understood what they were being asked to do, whether or not it was too difficult, and whether or not they did the activity in the way it was intended. The results indicate that logistically the demo worked well and that visitors faced little difficulty completing the activity. Not all visitors engaged in hands-on play with the dinosaurs, preferring simply to discuss the questions; however, they still provided a good visual aid as evidence by the answers of several respondents.

Each of the scenarios proved to be successful and effective, though each of them presented their own challenges. The T. rex scenario was the most popular overall, but while most participants thought of roaring and other classic aggressive actions immediately, they struggled to recount more subtle visual communication strategies. The Stegosaurus and Parasaurolophus scenarios both proved popular and effective as well. Visitors were typically able to quickly and accurately assess the communication strategies used by each. An exception to this was the Parasaurolophus resonating chamber, though this was a little-known fact and ultimately provided a positive moment of excitement at learning something knew. The Triceratops scenario was the most problematic of the four, as participants repeatedly struggled to identify the frill and horns as a major source of visual communication for the dinosaur.

Visitors in a wide range of ages expressed interest in the demo, and outside of the standard 5-10 year old audience, it was most popular with those younger than five. For the majority of these visitors the structured activity could not be used due to the more formalized nature of the scenarios and questions. Instead, younger visitors tended to engage in free play with the dinosaurs, which, at times, could be directed into acting out scenarios like those utilized in the structured demo.

The educational message of the demo on animal communication and its differences from human communication proved somewhat difficult to convey. Most participants saw the strategies that dinosaurs used to communicate as the main educational aim of the activity. This was the most obvious aspect of the demo, and thus it is unsurprising that it was what they took away. Some participants did make the larger connection of these traits as some of many used by animals, as well as their differences from human language communication.

At the conclusion of this evaluation, the following recommendations leave room for further development and improvement of the demo. In several instances participants expressed a desire for a more immersive scenario in which to act out the scenes. A simple backdrop or mat would provide a method to do so without adding extraneous features that could distract from the intended focus. Participants were also interested in adding on other dinosaurs. One such suggestion was the velociraptor, which could be used for a scenario about pack hunting and communication. In terms of better communicating the main learning goal of the demo, discussion of these same scenarios and traits in modern animals may help to convey the universality of them.

Dinosaur Communication may be incorporated into an app on dinosaur linguistics, and as part of the app it could serve as the method to explore why dinosaurs had the communicative abilities they did and how they used them in practice. This could be presented in different ways. It could

act as the primary framework of the activity, and within each scenario users could explore the specific biology and linguistics that were utilized to communicate. It could also be used a secondary level of information, with users initially looking at the biology of dinosaurs' communicative features, and then exploring how those features worked in context by presenting these scenarios.

References

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Appendix: Questionnaire

The following form was utilized to evaluate visitor's experiences with Dinosaur Communication.

COSI Labs in Life Language Pod Demo Formative Evaluation

Participant Questionnaire

Number of participants in gr	oup:			
Age(s):				
Gender(s):				
Relationship to each other:	family	friends	other:	

- 1. What was your favorite thing about this demo? What was your least favorite thing?
- 2. Did you find this demo difficult or confusing? Why do you say that?
- 3. What do you think we wanted you to learn from this demo?
- 4. What could we do to make this demo better?
- 5. Any further comments?

Investigator Reflection/Observation Questionnaire

- 1. How was the demonstration physically set up? What were the pros and cons of this?
- 2. What were participant's initial reactions to the demo?
- 3. Did participants read/listen to the instructions?
- 4. Did participants read/listen the background information?
- 5. What steps of the activity did participants do? Which did they not do? What alternative methods did they use?

Activity Step	Completed	Alternative Method
Pick dinosaur	Y/N	
Interact/act out scene	Y/N	
Answer question	Y/N	

Pick another	Y/N	
dinosaur and repeat		

- 6. Were participants able to complete the activity? If not, why?
- 7. If applicable, what kind of assistance did you need to provide to participants so that they could complete the activity?
- 8. Did participants interact with each other?
- 9. Did participants discuss what they were doing/had done in the activity with one another? What did they discuss?