

# How can we expand the way we design for emotion in informal learning?

*Developing Guidelines for Designing Challenging and Rewarding Interactive Science Exhibits (DRL-1612577)* is using design-based research to extend our understanding of how negative emotions can support learning by exploring how to design for productive struggle in museums.

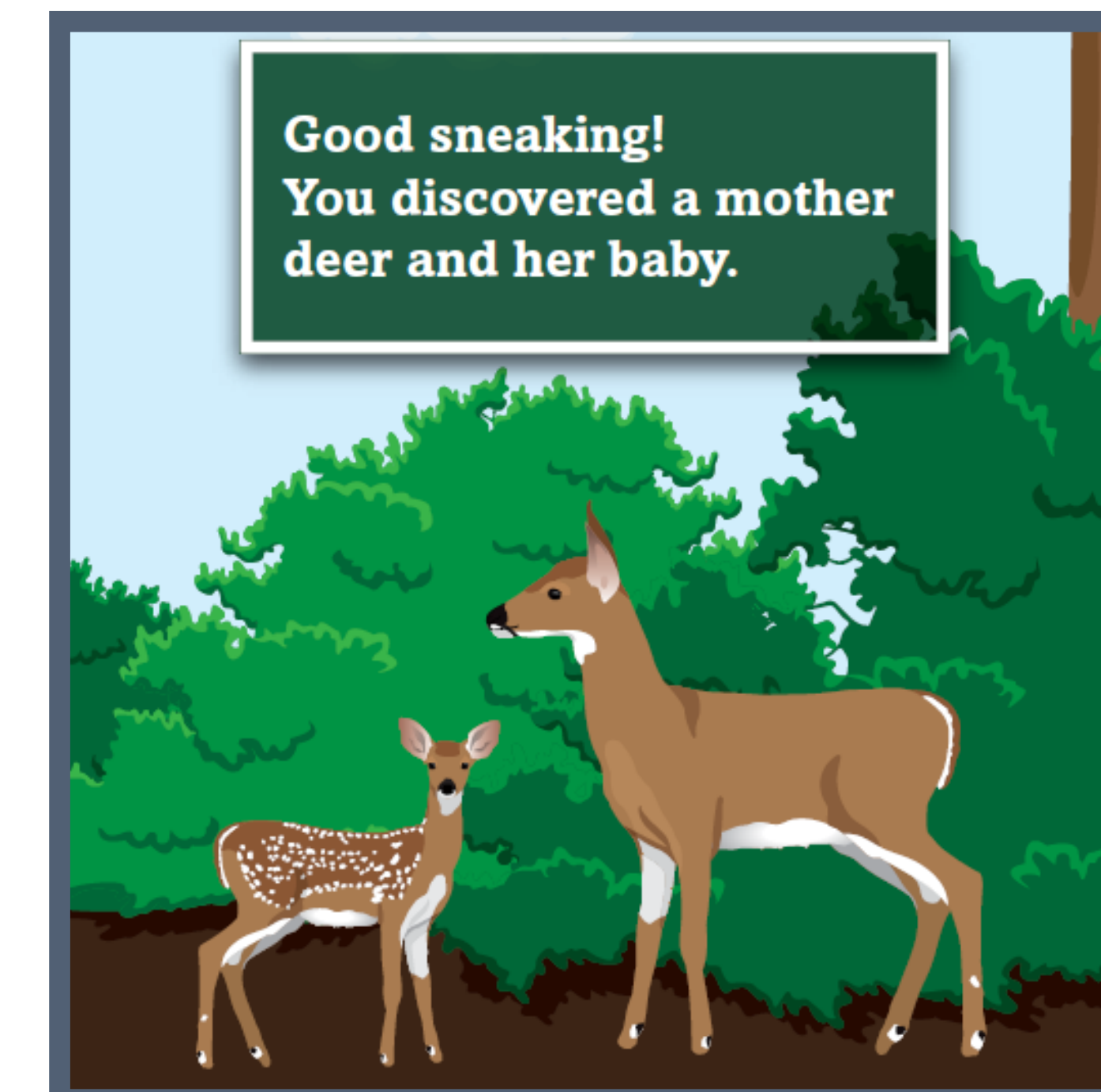
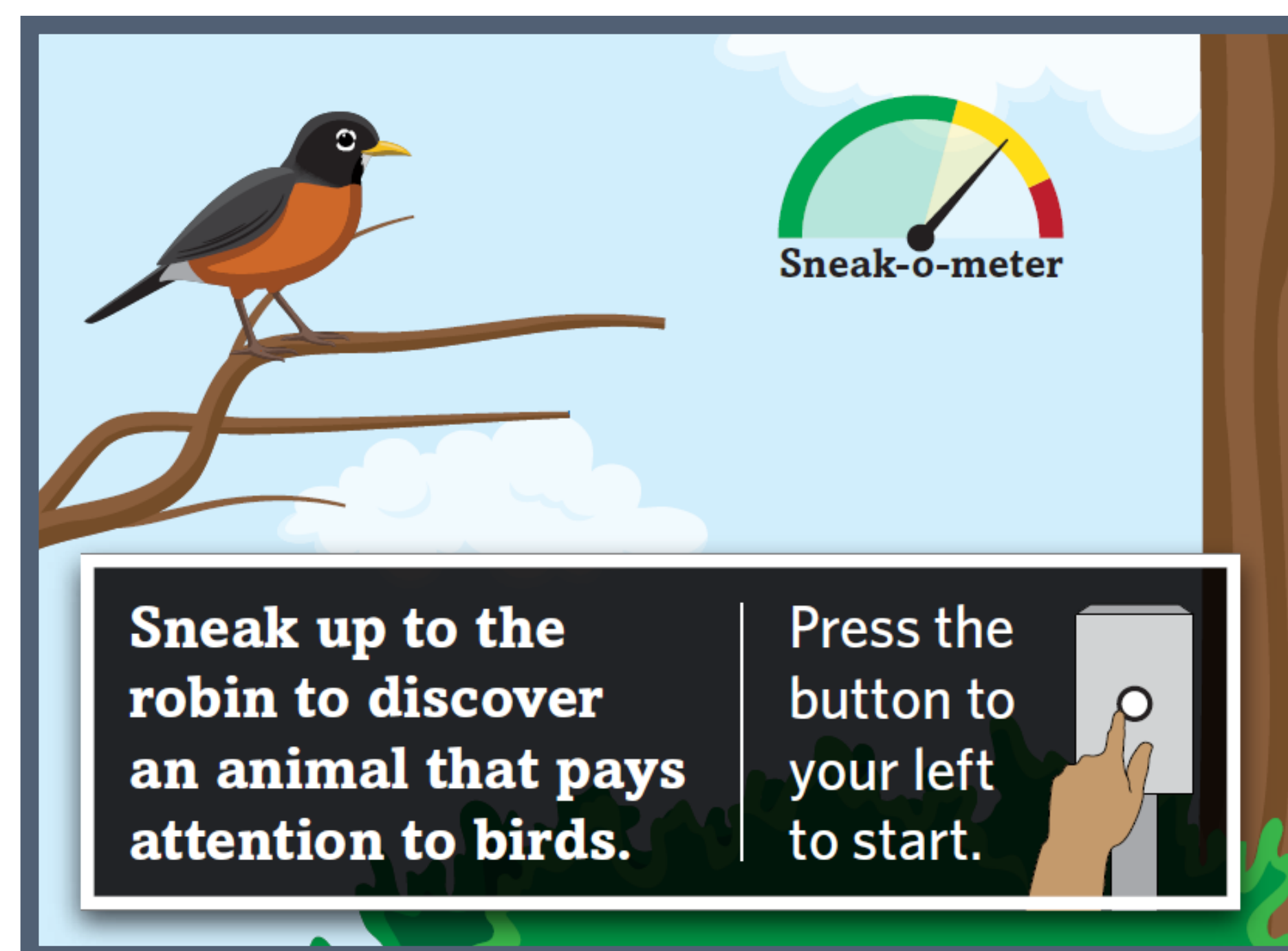
## An example: Sneak

Can you get by the bird to see other animals?



Our team is developing, testing, and applying a design framework of evidence-based approaches to make exhibits that support productive struggle, a challenging but meaningful learning experience that includes three aspects:

1. Emotional disequilibrium
2. Persistence
3. Productivity



### Emotional Disequilibrium

Definition	The visitor experiences a shift from her or his emotional home base.
Associated emotions	Difficulty, surprise, confusion, frustration
Example design strategy	Provide an experience that encourages deep emotional processing
Design example	Visitors self-regulate their physical and emotional states to sneak up on a digital bird. Challenge is set so 25% of attempts succeed.
Case example	“It’s not like you just push a button and it does something. You have to work to complete it.”

### Persistence

Definition	The visitor chooses to persist towards a goal.
Associated emotions	Focus, motivation, determination
Example design strategy	Provide feedback about progress and make it clear when and why failure and success occur.
Design example	A “sneak-o-meter” visualizes visitors’ speed, a birds body language adjusts as visitors move, and bird alarm calls indicate progress.
Case example	“If you watch the meter you could see if you’re doing a good job or a bad job.”

### Productivity

Definition	The visitor’s emotional disequilibrium is reduced or resolved.
Associated emotions	Pride, accomplishment, satisfaction, realization
Example design strategy	Elicit satisfaction through new learning or completing an exciting or meaningful task.
Design example	Visitors learn that some mammals run away when they hear birds’ alarm calls. If visitors succeed they see a doe and a fawn.
Case example	“[It was satisfying] because you finally made it, you put effort in and get to find out what the animal is.”

## RESEARCH METHODS

- Galvanic skin response sensors** measure subjects’ real-time physiological activation
- Video recordings** and observations allow researchers to track behavior
- Eye tracking glasses** measure cognitive and behavioral engagement
- Self-report surveys** evaluate emotional experience and mindset factors
- Stimulated recall interviews** have visitors reflect on what they did, and how they felt, and how design features impacted their experience



Biometric data shows visitor reactions to exhibit design.



Eye-tracking data illustrates what visitors attend to.

## WHO WE ARE

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## CREDITS

This presentation is based on work supported by the National Science Foundation under Grant No. DRL-1612577. Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the authors and do not necessarily reflect the views of the Foundation.

Images: Wristband by Leonardo Schneider; Video by Jivan; Glasses by Hea Poh Lin; Clipboard by Nick Bluth; Interview by Gregory Cresnar; & Chat by Logan from the Noun Project.

## Overall Design Principle: Managing Struggle Budget

The whole experience applies clear design so the visitor doesn’t spend too much of her physiological “struggle budget” figuring out how to use the exhibit.