

HUMAN-ANIMAL INTERACTIONS IN ZOOS AND AQUARIUMS

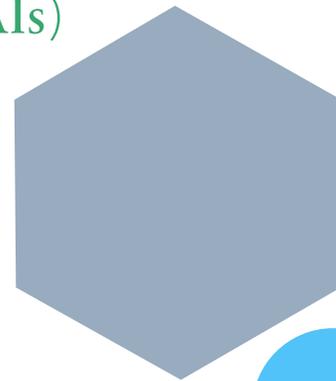
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TALK OUTLINE

1. What are Human-Animal Interactions (HAIs) and Animal-Visitor Interactions (AVIs)?
2. An Empirical Assessment of Growth (i.e., things have been changing!)
3. Where do we go from here? (Recent research and future practice)



WHAT ARE HAIs?

- Human-Animal Interactions (HAIs) involve the study of all forms of contact animals have with people (Human-Animal Relationships [HAR]; Human-Animal Bonds [HAB]; Hosey & Melfi, 2014).
- Research settings and areas can include (livestock interactions; Hemsworth, 2003), companion animals (animal-assisted therapies; Griffin et al., 2019), and of course, zoos (Fernandez & Chiew, 2021; Fernandez & Sherwen, 2025).
- In zoos and aquariums, these are typically studied as Animal-Visitor Interactions (AVIs; Fernandez et al., 2009; Lin et al., 2025), although research can involve more than just visitors, such as interactions with staff (Ward & Melfi, 2015).
- AVIs are usually studied as either the impact of the visitor on the animals (visitor effects; Hosey, 2000), or the impact of animals on the visitors (visitor experience; Godinez & Fernandez, 2019).

ANIMAL-VISITOR INTERACTIONS (AVIs): Effects versus Experiences

VISITOR EFFECTS



VISITOR EXPERIENCES



WHAT ARE AVISs?

VISITOR EFFECTS

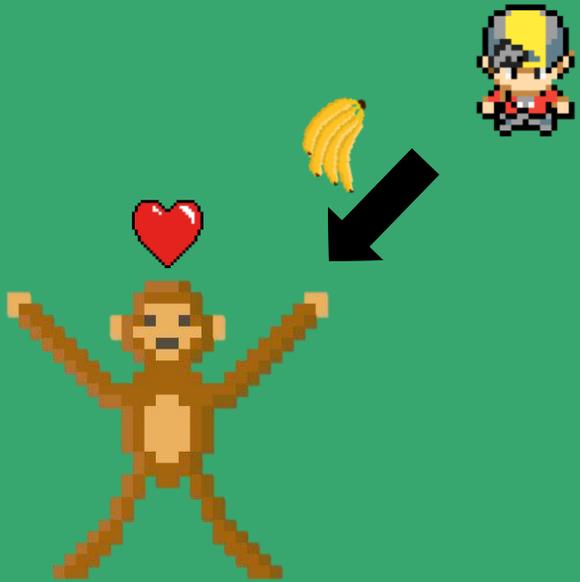
VISITOR EXPERIENCES



WHAT ARE AVISs?

VISITOR EFFECTS

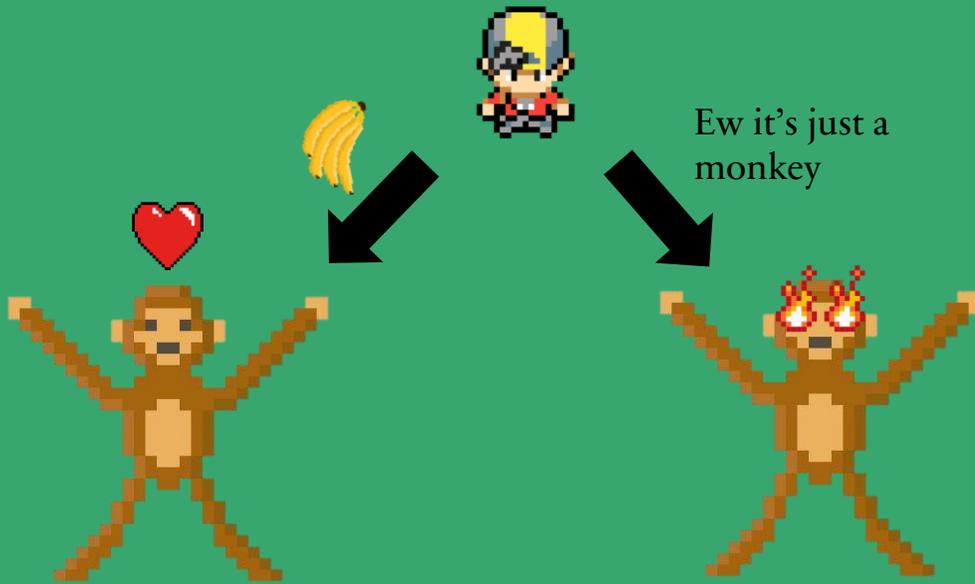
VISITOR EXPERIENCES



WHAT ARE AVIS?

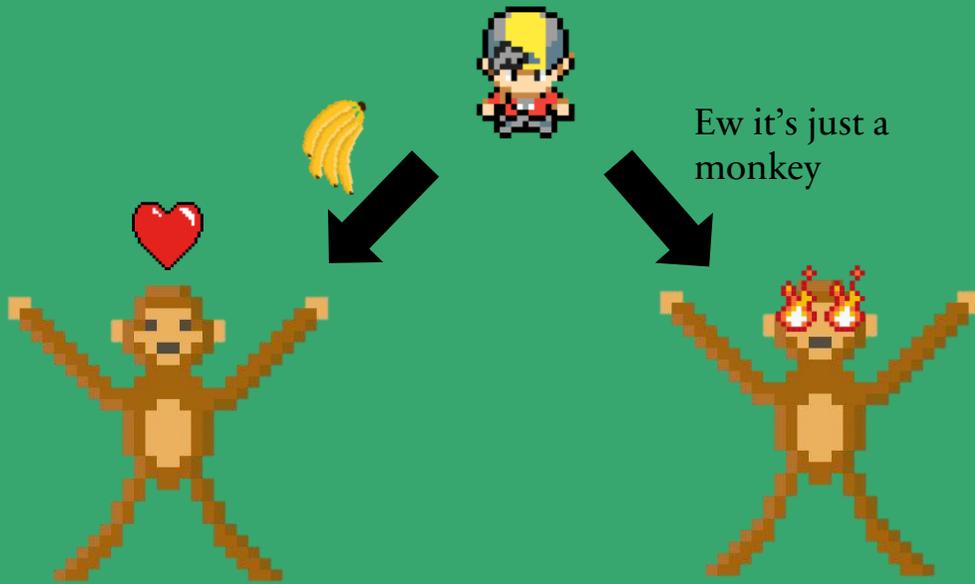
VISITOR EFFECTS

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WHAT ARE AVIS?

VISITOR EFFECTS

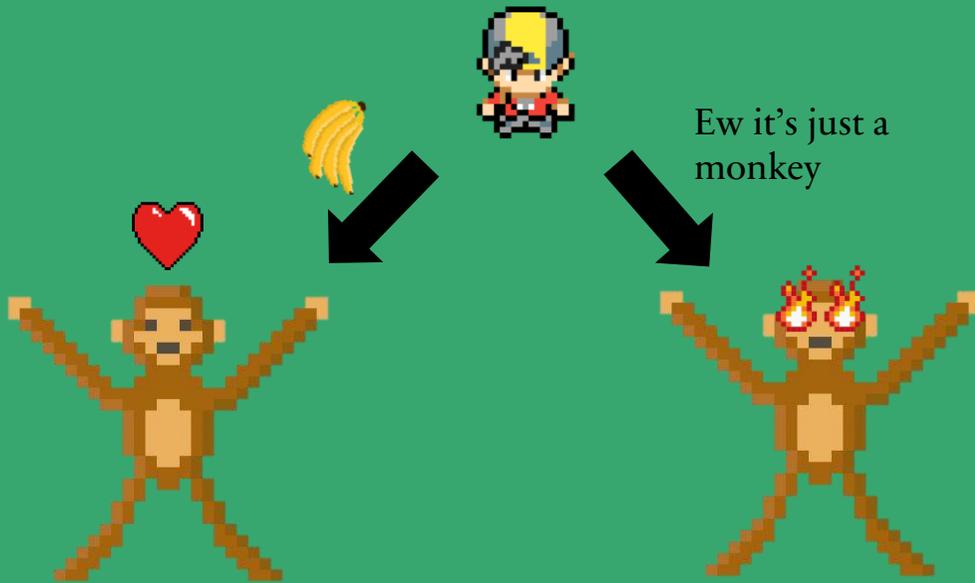


VISITOR EXPERIENCES

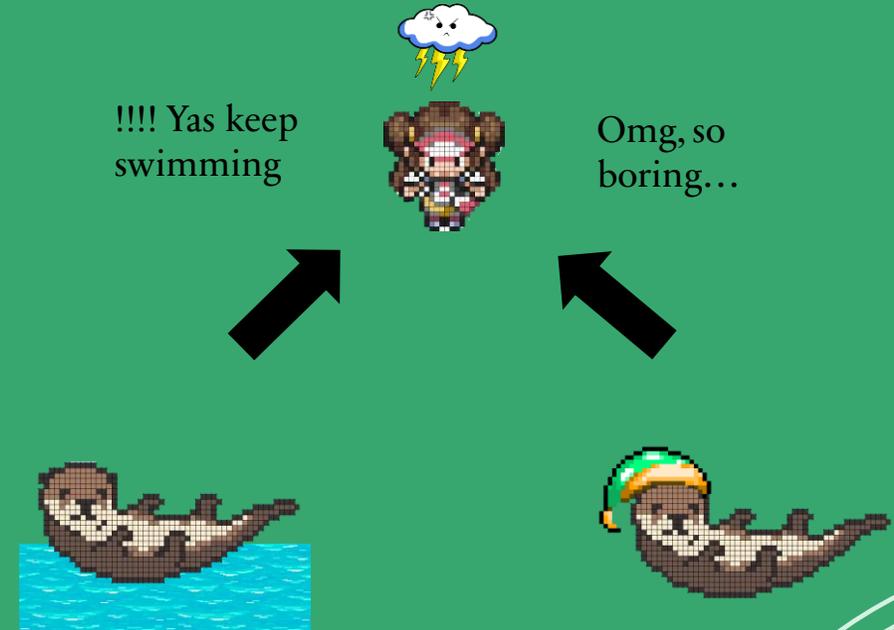


WHAT ARE AVISs?

VISITOR EFFECTS



VISITOR EXPERIENCES



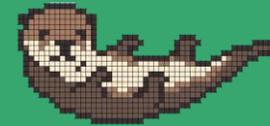
WHAT ARE AVISs?

VISITOR EFFECTS

VISITOR EXPERIENCES



NEUTRAL



AVI STUDIES (REVIEWS)

- Considerable growth in the last few decades.
- The reviews until now tell us a bit:
- Most only on visitor effects (Hosey, 2000; Davey, 2007; Sherwen & Hemsworth, 2019).
- More recently, reviews of visitor experience (Godinez & Fernandez, 2019; Learmonth et al., 2021).
- Earlier focus on negative visitor effects on primates (Hosey, 2000; Hosey, 2005).
- However, most recent reviews suggest increased non-primate studies (Williams et al., 2023).
- Also, reveal how much direct interactions zoos around the world provide (D’Cruze et al., 2019).



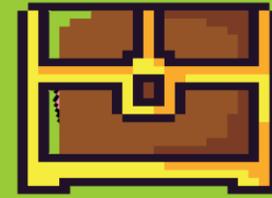
OUR REVIEW

LIN, NG, & FERNANDEZ (2025)

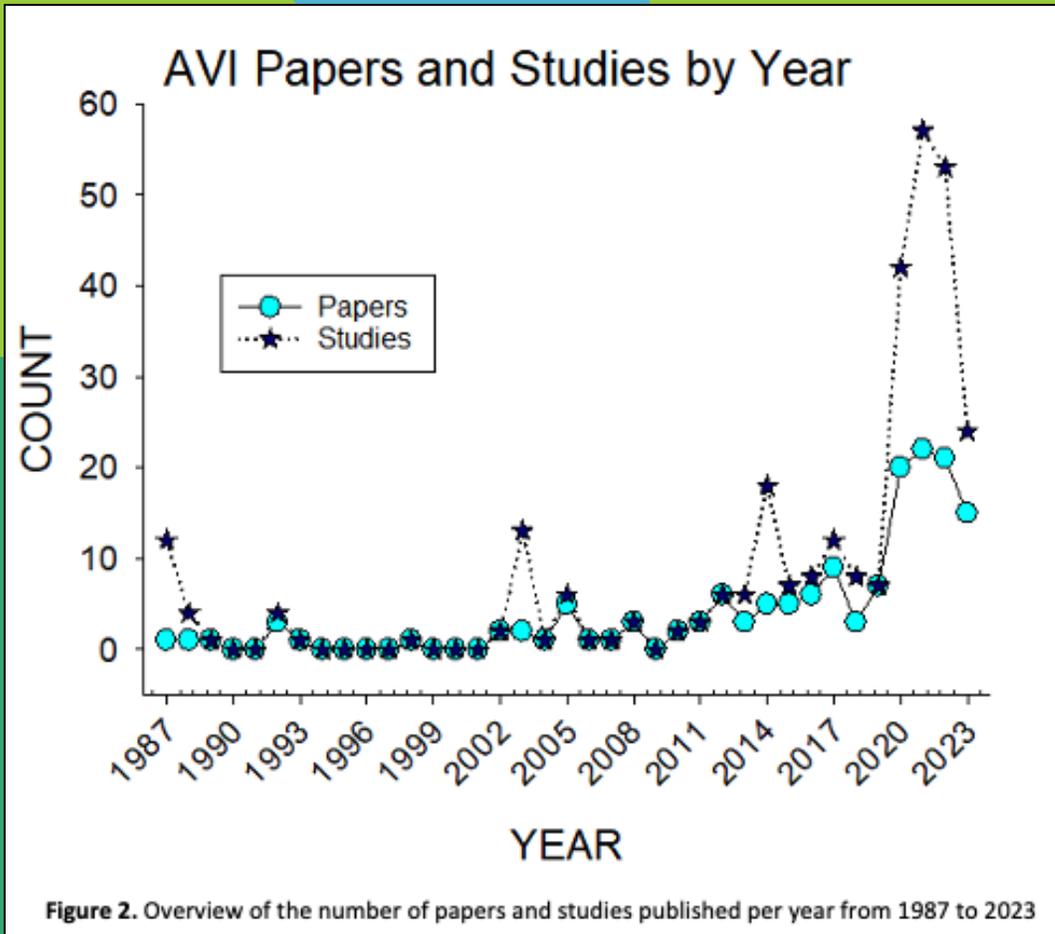
- First systematic review (PRISMA; quantitative and hypothesis driven).
- We looked at ALL studies claiming to be an AVI (151 papers; 304 studies).
- Compared changes (increase) over time.
 1. Predicted recent increase in AVI studies (exponential rise!)
 2. Predicted increase in both visitor experience and effects studies (not just effects).
- Also, with respect to visitor effects studies:
 3. Predicted increase in non-primate species studied.
 4. Predicted increase in positive effects recorded.



KEY FINDING 1

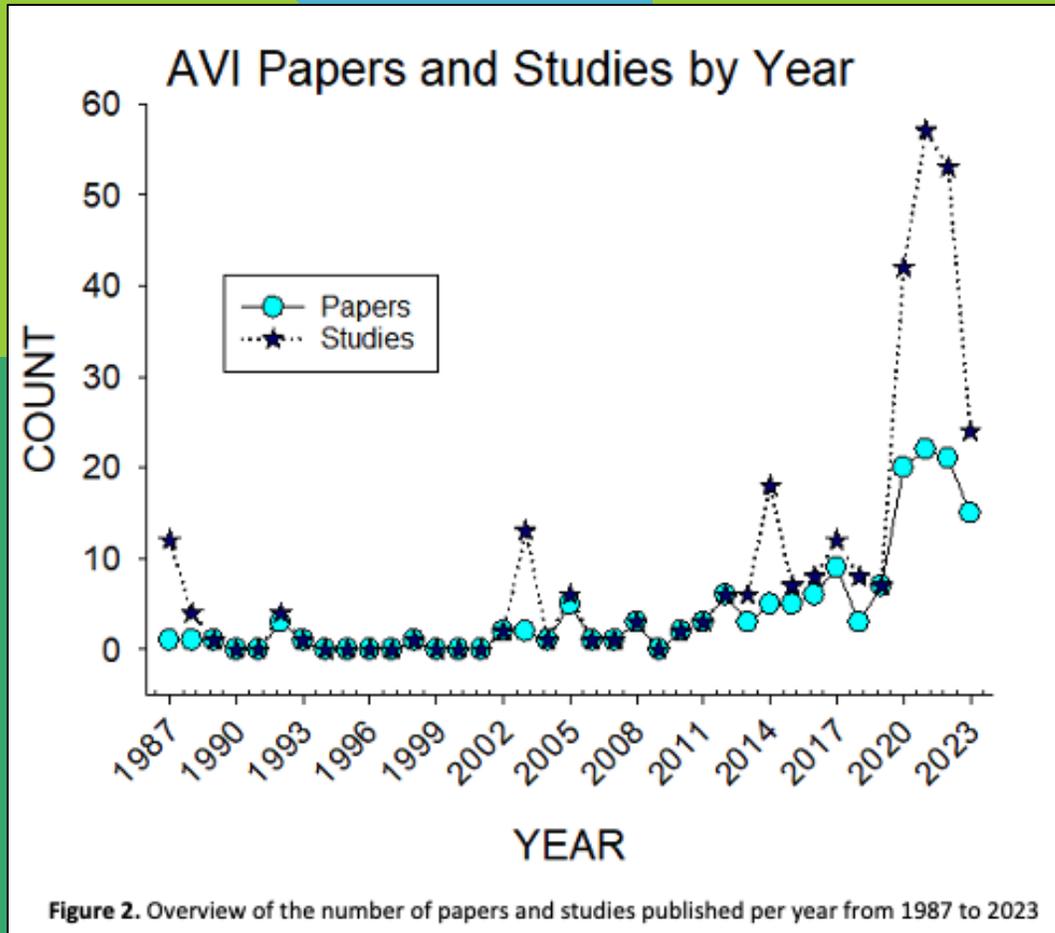


Increase in number of AVI papers and studies (2020-2023):





KEY FINDING 1



Increase in number of AVI papers and studies (2020-2022):

- Consistently more papers/studies published from 2010.
- 2020-2022 saw largest portion of papers/ studies published.
 - Papers: n=62, 41.1% of all published papers
 - Studies: n=152, 50% of all published studies

Williams et al. 2023 suggested surge may be due to COVID-19.

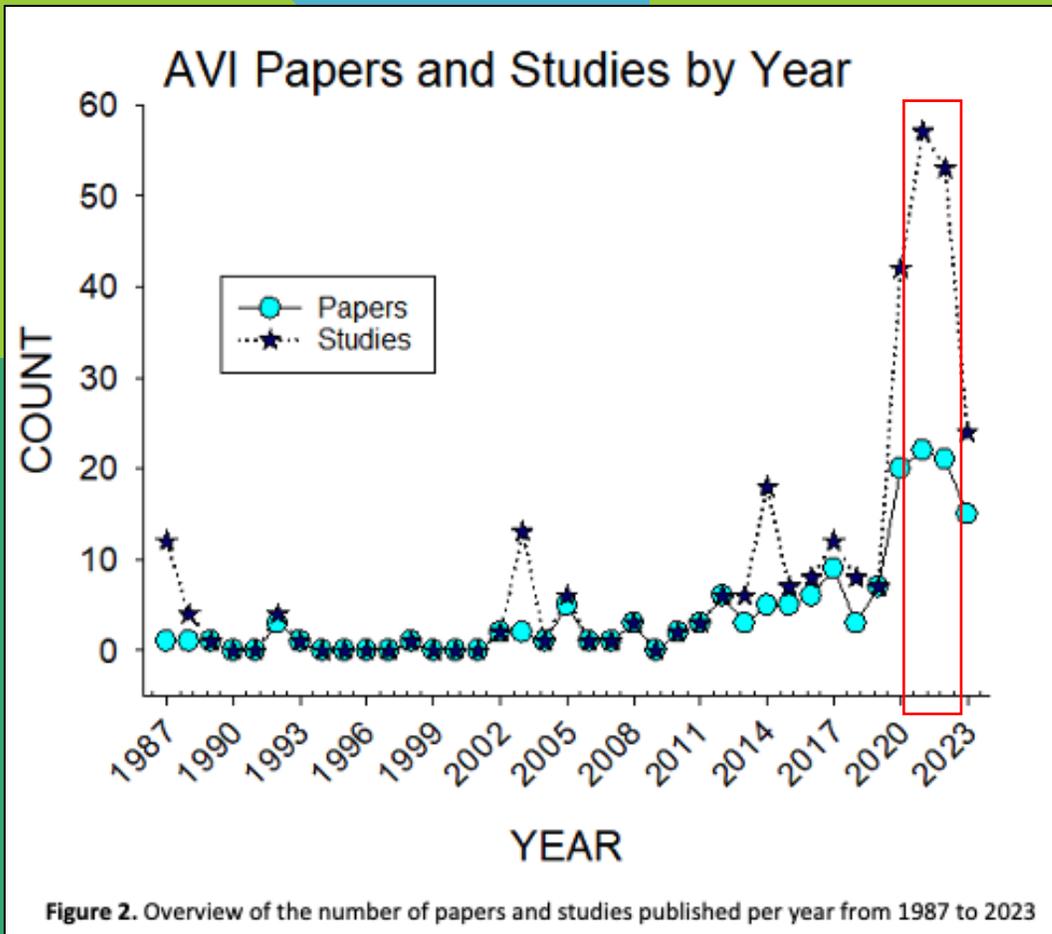


KEY FINDING 1



Increase in number of AVI papers and studies (2020-2023):

- Majority of papers were unrelated to COVID-19 (data collection conducted between 2010-2019).
 - Papers related to COVID-19: n=20 (18 to 2022)
 - Papers unrelated to COVID-19: n=57 (44 to 2022)



	Unrelated to COVID-19		COVID-19 Related	
	Count (n)	Frequency (%)	Count (n)	Frequency (%)
2020	20	100.0	0	0.0
2021	14	63.6	8	36.4
2022	10	50.0	10	50.0
2023	13	86.7	2	13.3



KEY FINDING 2



Increase in both visitor effect and experience studies (significantly more visitor effect studies):

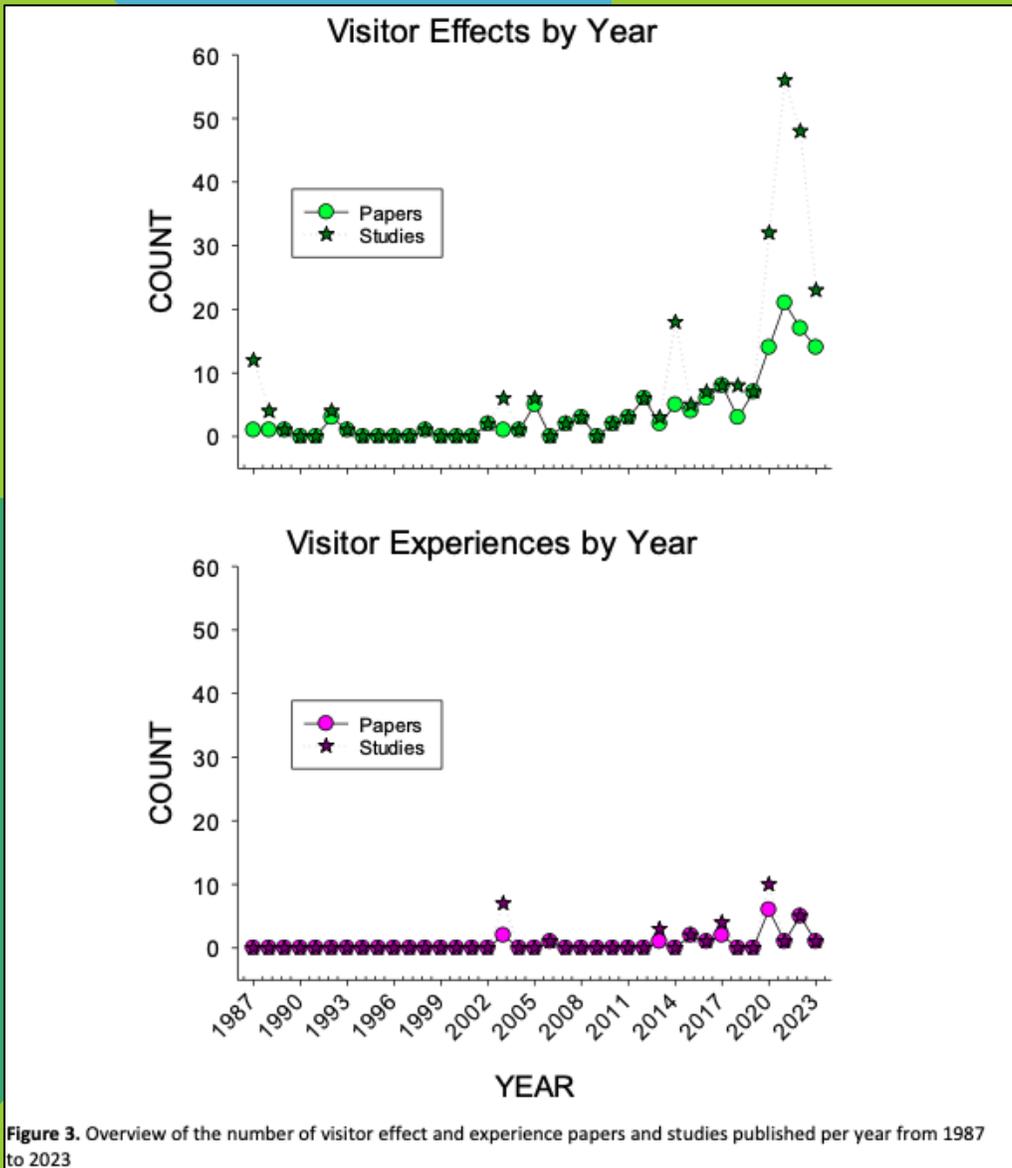


Figure 3. Overview of the number of visitor effect and experience papers and studies published per year from 1987 to 2023



KEY FINDING 2

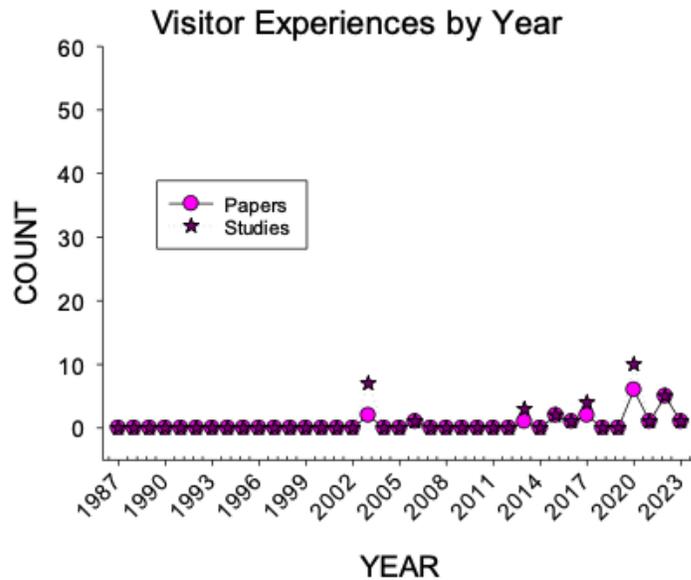
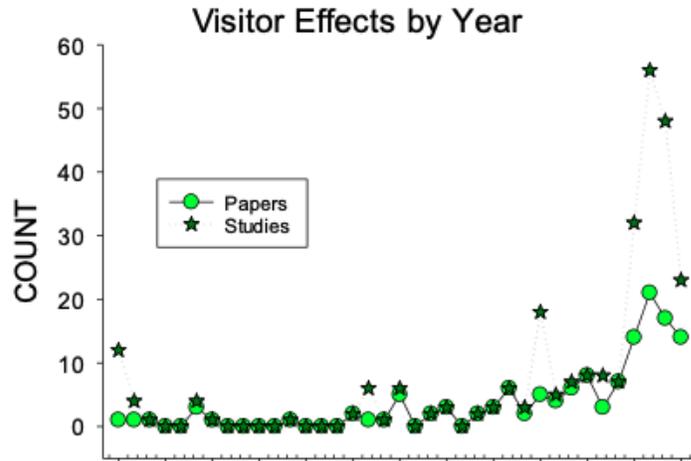
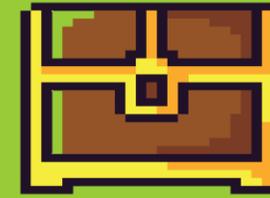


Figure 3. Overview of the number of visitor effect and experience papers and studies published per year from 1987 to 2023

Increase in both visitor effect and experience studies (significantly more visitor effect studies):

Visitor effect was observed significantly more than visitor experience.

- Papers: $\chi^2 = 80.410, df = 1, p < 0.001$
- Studies: $\chi^2 = 180.118, df = 1, p < 0.001$

Table 1. Summary of visitor effect and experience papers and studies

	Papers		Studies	
	Count (n)	Frequency (%)	Count (n)	Frequency (%)
Visitor Effect	134	88.7	269	88.5
Visitor Experience	22	14.6	35	11.5
Total	151*	103.3*	304	100

* Note: a total of 151 papers were included, 5 papers looking at both visitor effect and experience were included as separate papers



KEY FINDING 2

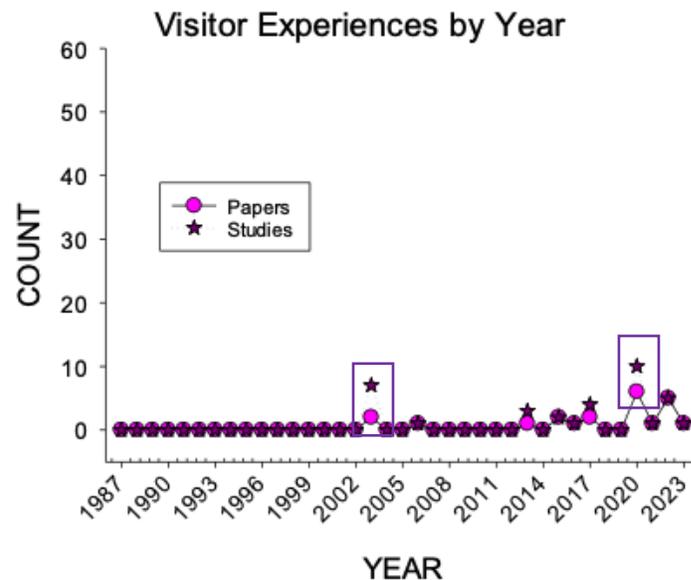
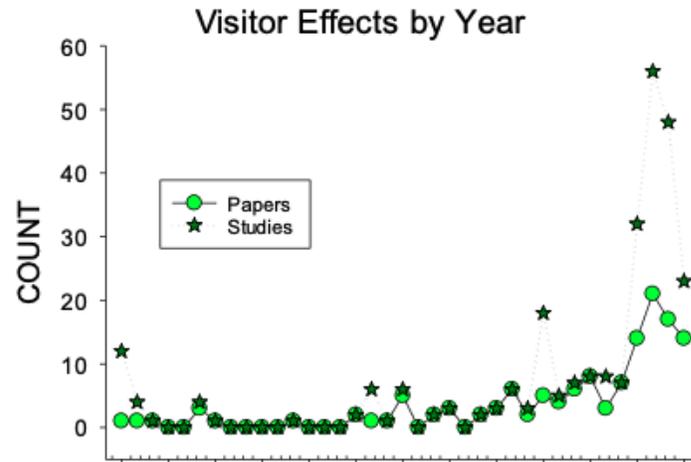
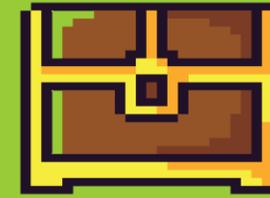


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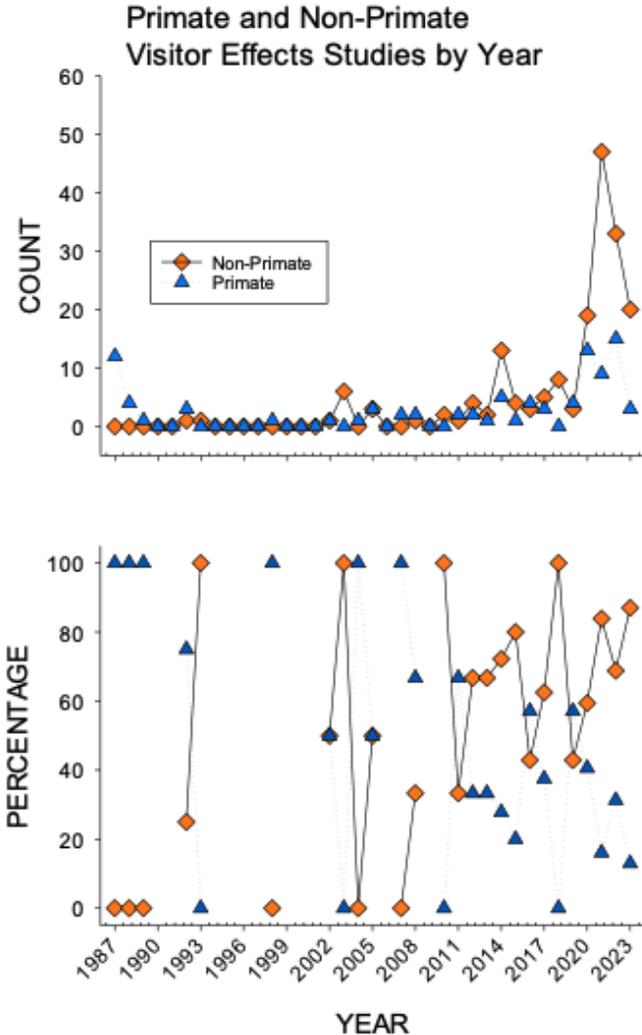
•Studies: $\chi^2 = 180.118$, $df = 1$, $p < 0.001$

Increase in visitor experience studies in the last three years.

- First visitor experience study in 2003.
- Marked increase in 2020 (n=10).



KEY FINDING 3

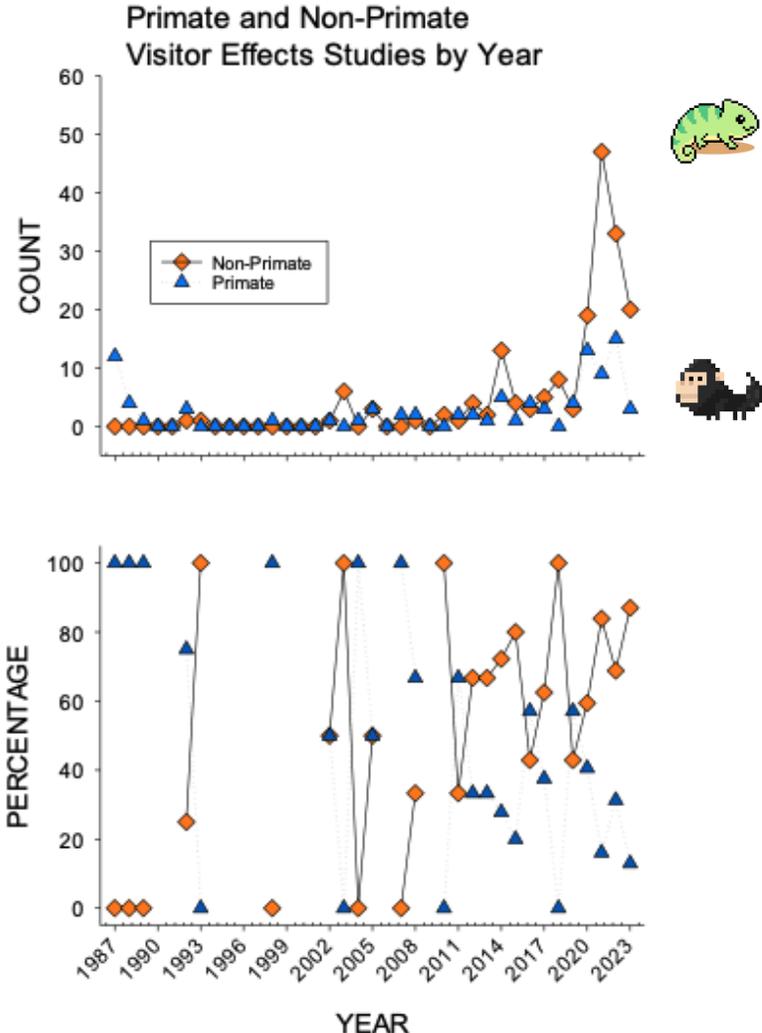
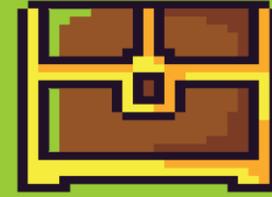


Increase in non-primate studies, with a predominant focus on mammals:

Figure 4. Overview of the number of primate and non-primate papers and studies published per year from 1987 to 2023



KEY FINDING 3



Increase in non-primate studies, with a predominant focus on mammals:

- There were significantly more non-primate studies overall ($\chi^2 = 26.859, df = 1, p < 0.001$).
 - Primate studies: $n=92, 34.2\%$
 - Non-primate studies: $n=177, 65.8\%$

Figure 4. Overview of the number of primate and non-primate papers and studies published per year from 1987 to 2023



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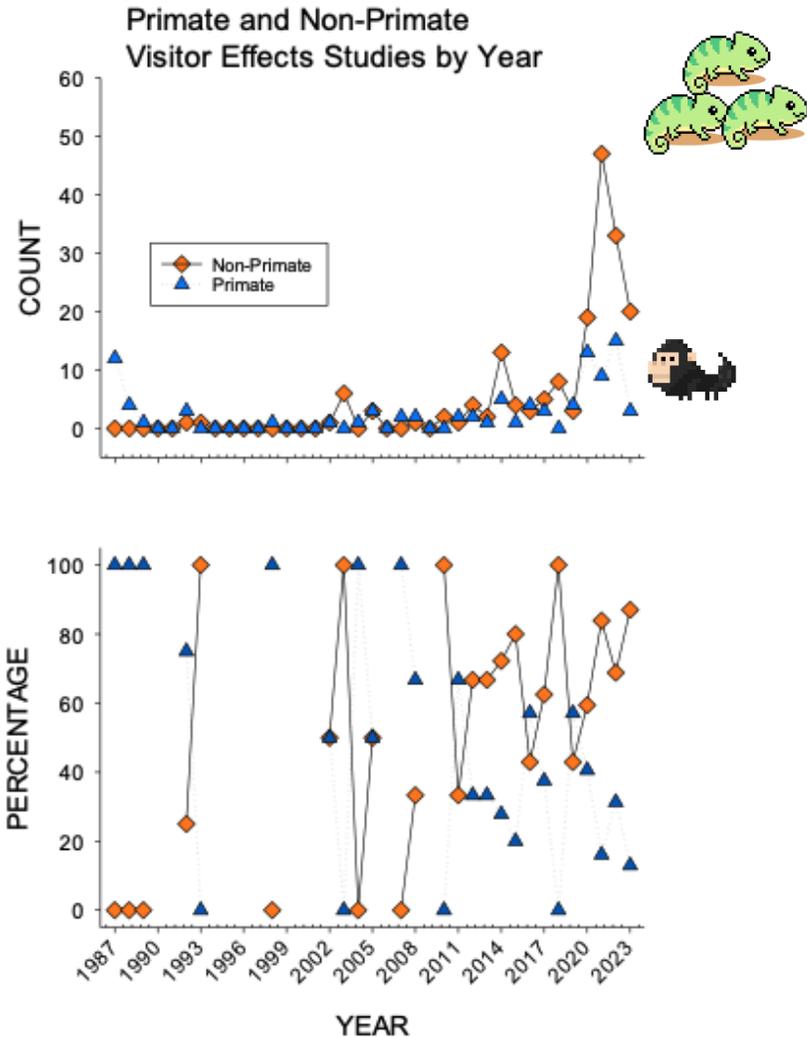
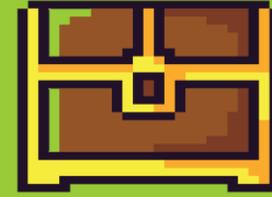


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Increase in non-primate studies, with a predominant focus on mammals:

- There were significantly more non-primate studies overall ($\chi^2 = 26.859, df = 1, p < 0.001$).
 - Primate studies: $n=92, 34.2\%$
 - Non-primate studies: $n=177, 65.8\%$
- There has been a positive trend in the frequency of non-primate studies.



KEY FINDING 3

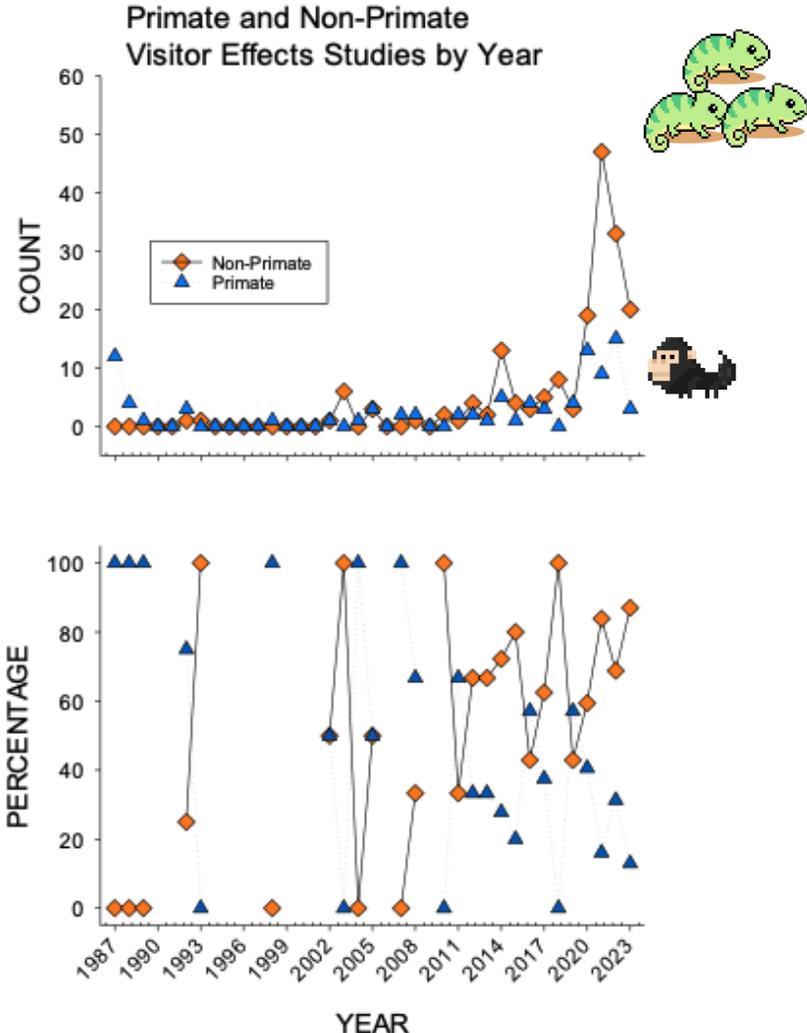
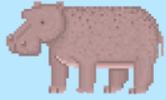


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Increase in non-primate studies, with a predominant focus on mammals:

- There were significantly more non-primate studies overall ($c^2 = 26.859$, $df = 1$, $p < 0.001$).
 - Primate studies: $n=92$, 34.2%
 - Non-primate studies: $n=177$, 65.8%
- There has been a positive trend in the frequency of non-primate studies.
- A significant portion of non-primate studies focused on mammals ($c^2 = 586.967$, $df = 4$, $p < 0.001$).
 - Mammals (78.4%, $n=211$) 
 - Birds (13.8%, $n=37$)
 - Reptiles (3.7%, $n=10$)
 - Amphibians (2.2%, $n=6$)
 - Fish (1.9%, $n=5$)



KEY FINDING 4



Decrease in the frequency of negative visitor effect outcomes and increase in the frequency of positive visitor effect outcomes:

Significantly more negative than positive visitor effect outcomes ($\chi^2 = 36.214$, $df = 1$, $p < 0.001$).

- Fish had lowest frequency of negative effects.
- Amphibians had highest frequency of negative effects.

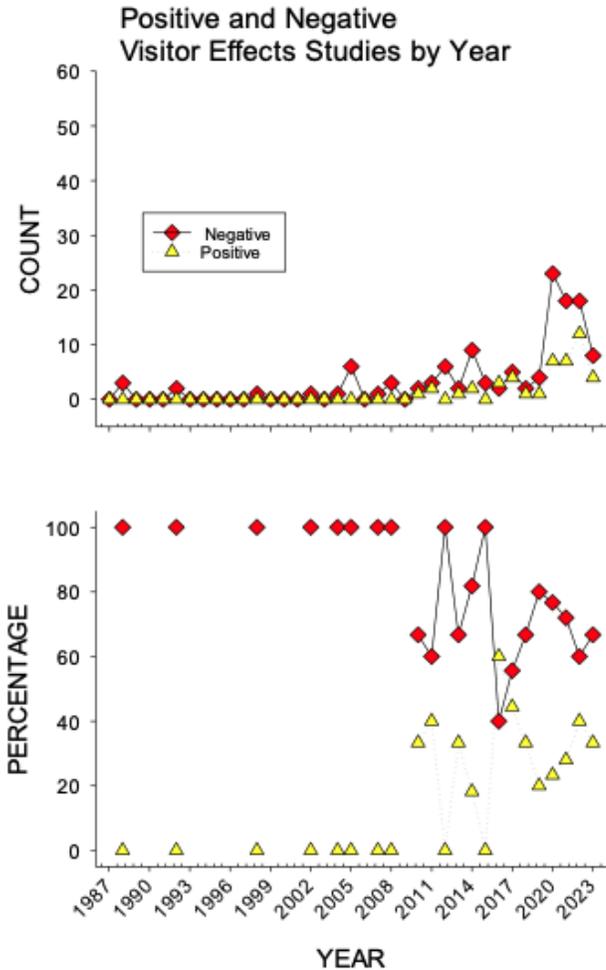


Figure 5. Overview of the number and percentage of positive and negative studies published per year from 1987 to 2023

	Negative		Positive	
	Count (n)	Frequency (%)	Count (n)	Frequency (%)
Mammal	95	72.0	37	28.0
Bird	14	73.7	5	26.3
Fish	2	66.7	1	33.3
Reptile	6	75.0	2	25.0
Amphibian	6	100.0	0	0.0



KEY FINDING 4

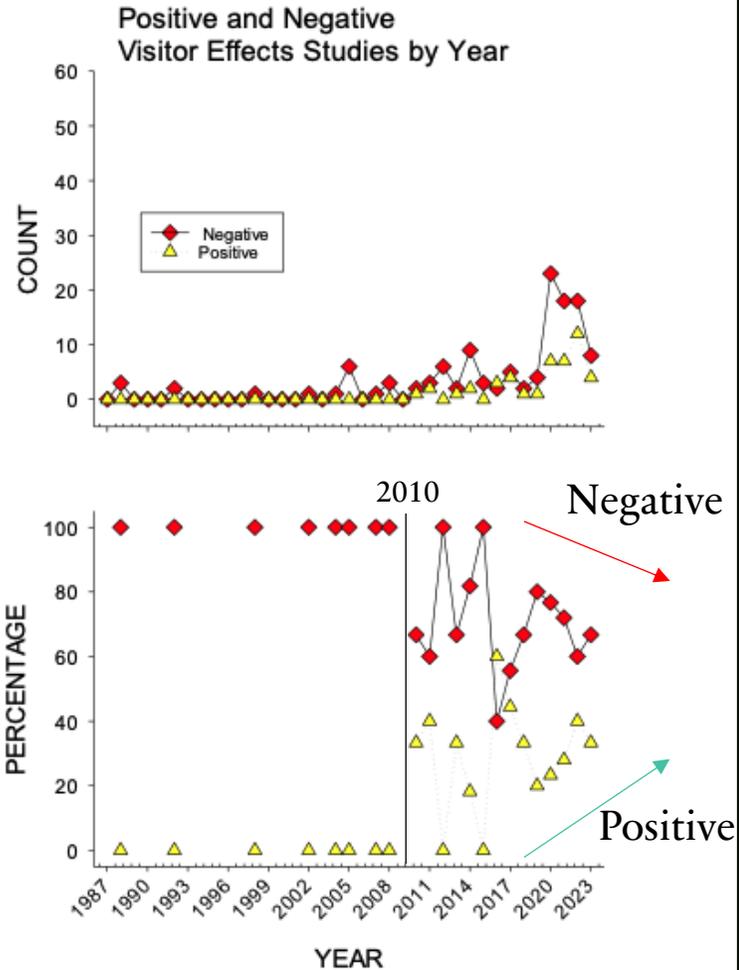
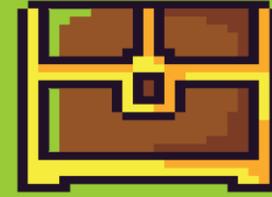


Figure 5. Overview of the number and percentage of positive and negative studies published per year from 1987 to 2023

Decrease in the frequency of negative visitor effect outcomes and increase in the frequency of positive visitor effect outcomes.

Significantly more negative than positive visitor effect outcomes ($\chi^2 = 36.214$, $df = 1$, $p < 0.001$).

- Fish had lowest frequency of negative effects.
- Amphibians had highest frequency of negative effects.

From 2010 onwards, decreasing frequency of negative outcomes, increasing frequency of positive outcomes.

CONCLUSION

INTERACTIONS	↑ Visitor experiences	↑ Visitor effects
TAXA	↑ Non-primate 	↑ Primate 
WELFARE IMPACT	↑ Positive 	↑ Negative 

More AVI papers and studies:

1. Increases in visitor experience interactions.
2. Increases in non-primate visitor effect studies.
3. Increases in positive effect recordings.

CONCLUSION

INTERACTIONS	↑ Visitor experiences	↑ Visitor effects	✓
TAXA	↑ Non-primate 	↑ Primate 	✓
WELFARE IMPACT	↑ Positive 	↑ Negative 	✓

More AVI papers and studies:

1. Increases in visitor experience interactions.
2. Increases in non-primate visitor effect studies.
3. Increases in positive effect recordings.

FERNANDEZ ET AL. (2021). PUBLIC FEEDING AS ENRICHMENT



Three elephants trained to interact with visitors during public feeding (Watoto [African]; Chai and Bamboo [Asian]).

Public feeding functions as a human-animal interaction (HAI), or animal-visitor interaction (AVI).

Does being fed by visitors have an enriching effect?

- In other words, is there a positive visitor effect for the elephants from a public feeding event?

PROCEDURE:



Two conditions/days:

- Public feeding (PF)
- No public feeding (No PF; Baseline)

Three periods:

- Before, During, and After PF

Six classes of behavior measured:

- Active, Forage, Social, Inactive, Stereotypy, and Other

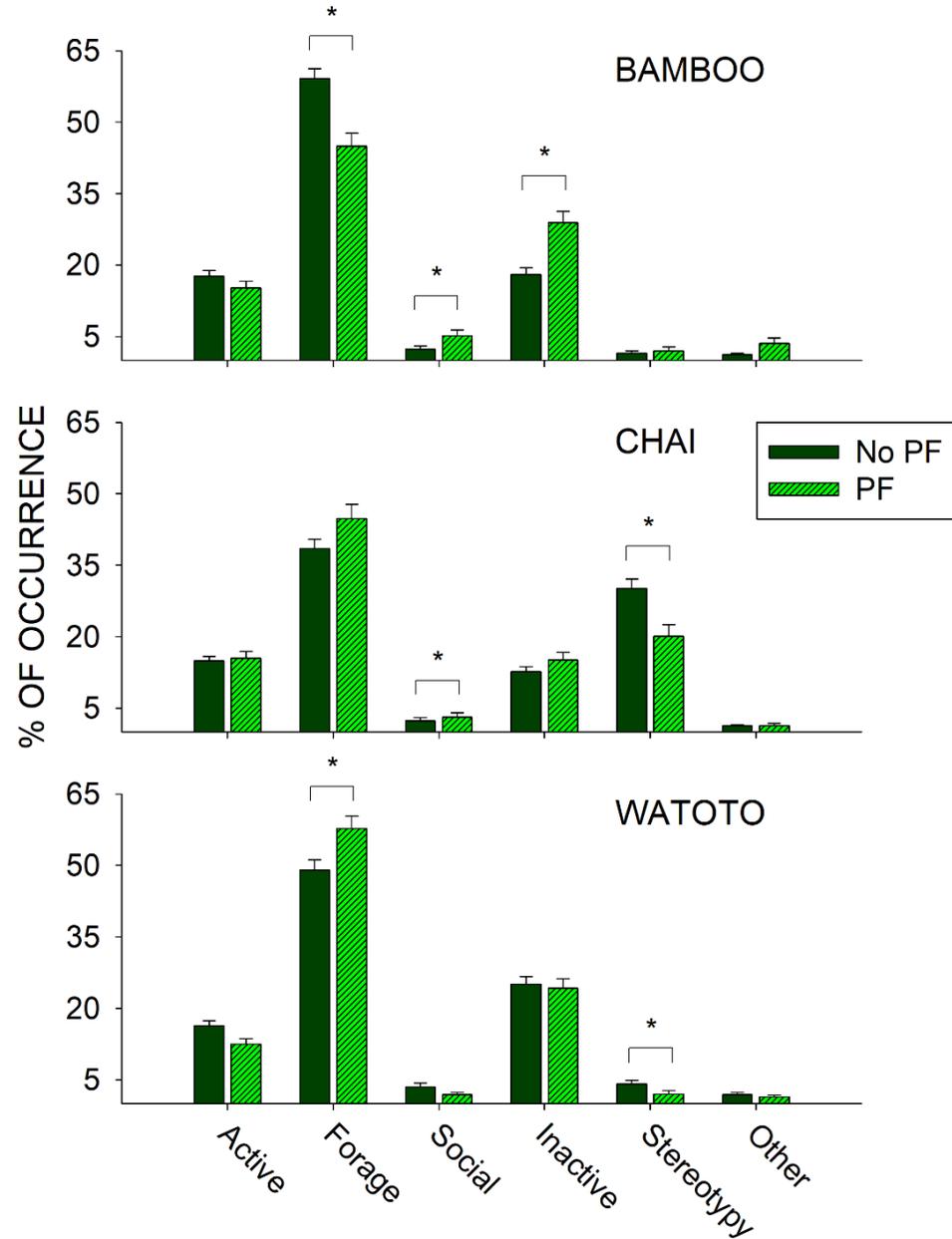
5-min sessions: 7 days a week, for 5 months:

- ~1500 sessions; ~130 hours



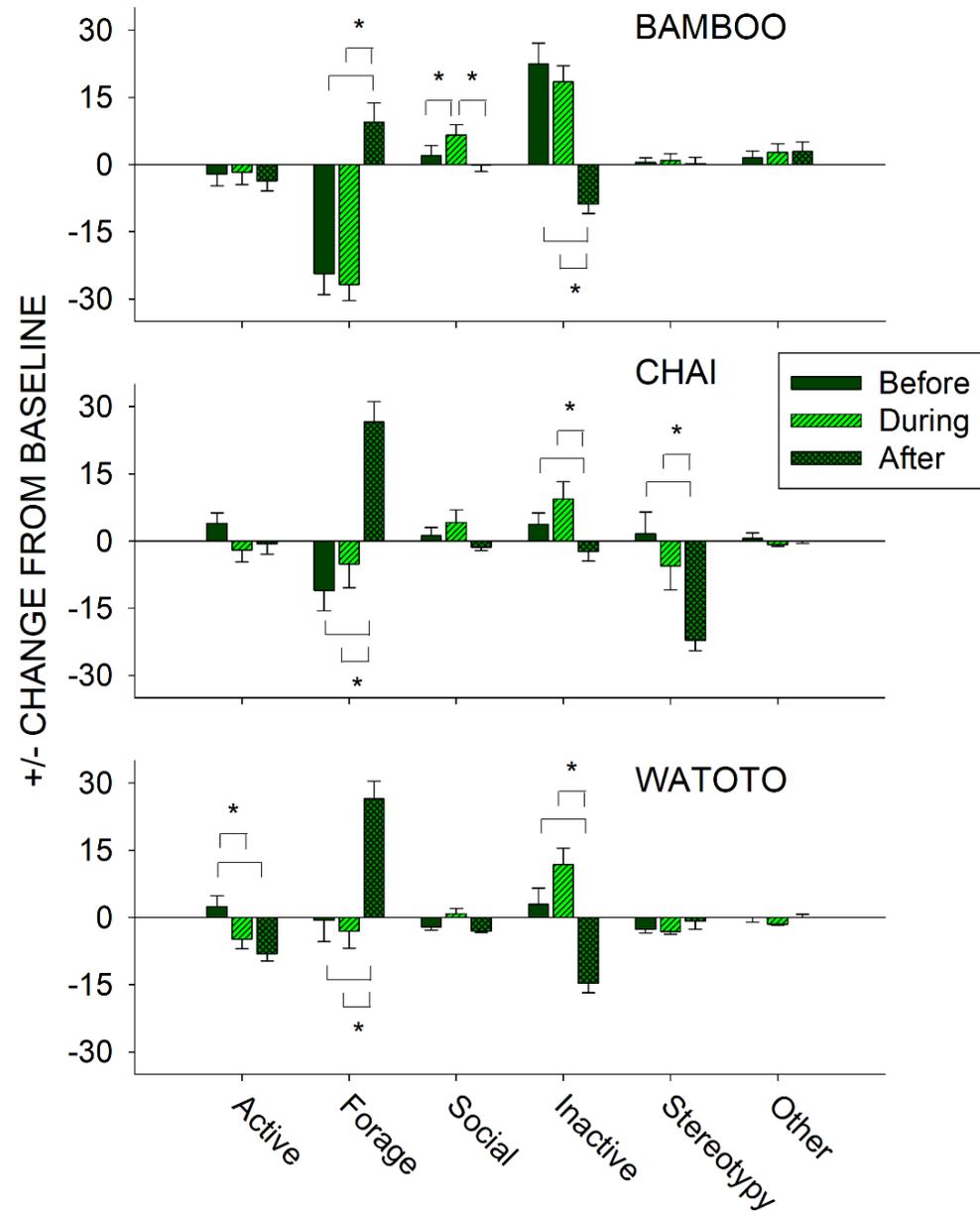
Results – PF/No PF:

- Two elephants increased social behaviors during PF (Bamboo & Chai)
- Two elephants decreased stereotypies during PF (Chai & Watoto)
- Watoto increased foraging during PF
- So, what happened to Bamboo?
 - Decrease in foraging
 - Increase in inactivity
- PF/No PF compares differences between a PF *day* and a No PF *day*.
 - We need more detail!

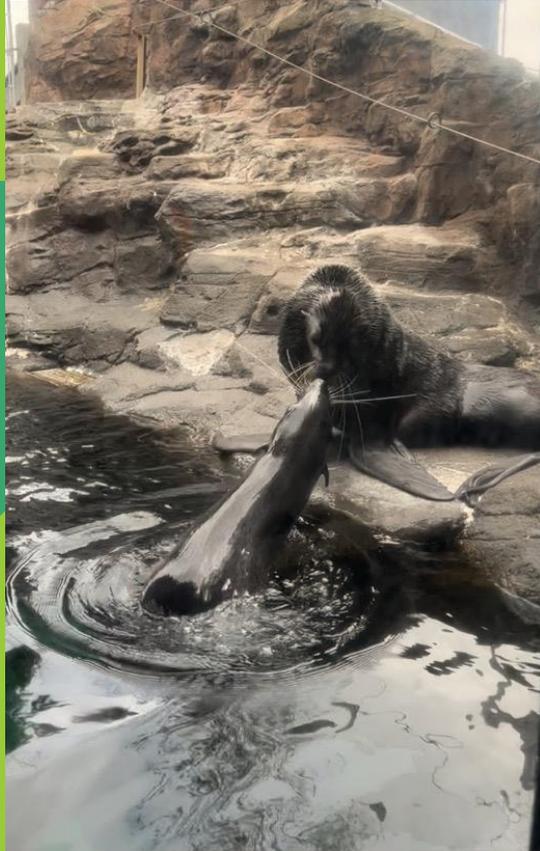


Results – Before, During, & After PF:

- THIS analysis tells us what happens in relation to *when* the event occurs.
- All three elephants showed an increase in foraging AFTER a public feeding.
- Inactivity was also decreased most AFTER a public feeding.
- *The public feeding INCREASED foraging activity AFTER the event and for all 3 elephants!*



NORTHEY ET AL. (2023). NEW SEAL INTRODUCTIONS



We studied the effects of two new seal introductions to two existing exhibits.

What effect does introducing a new harbour seal have on two existing seals?

What effect does introducing a new fur seal have on a solo-housed fur seal?

What effect do these introductions have on the aquarium visitors?

PROCEDURES



- Two conditions: Before and After new seal introduction.
- Two experiments: Harbor seals (Exp 1) and Northern fur seals (Exp2).
- Behavioral Ethogram
 - 15 behaviors split into 5 classes: Active, Inactive, Social, Stereotypy, & Other
- One-hour observation sessions, daily (4 months total).
 - Experiment 1: Before – 43 sessions; After – 50 sessions
 - Experiment 2: Before – 37 sessions; After – 79 sessions
- For the sake of time, I will only present Exp 2 (fur seals):

EXPERIMENT 2: NORTHERN FUR SEALS

Condition 2A:
1 fur seal



Flaherty
Male, 9 years old

Introduction

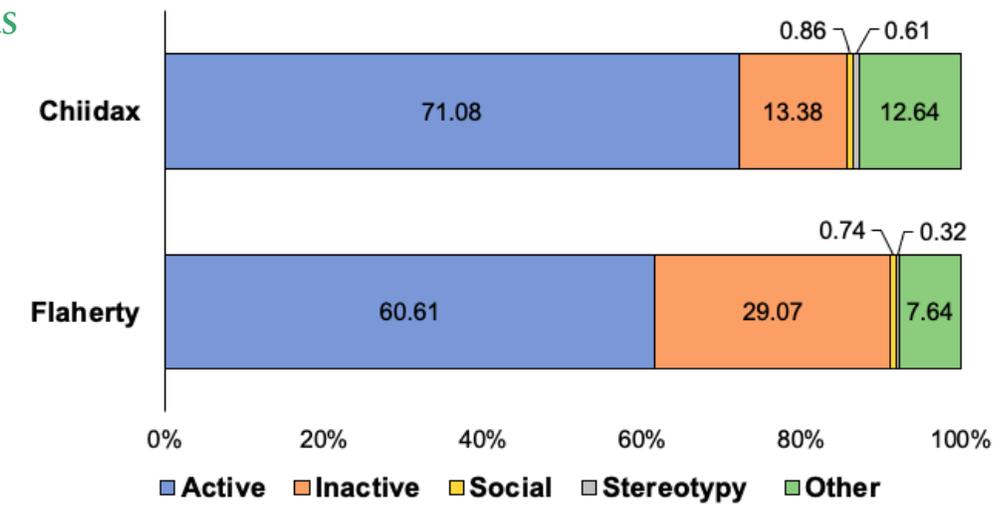
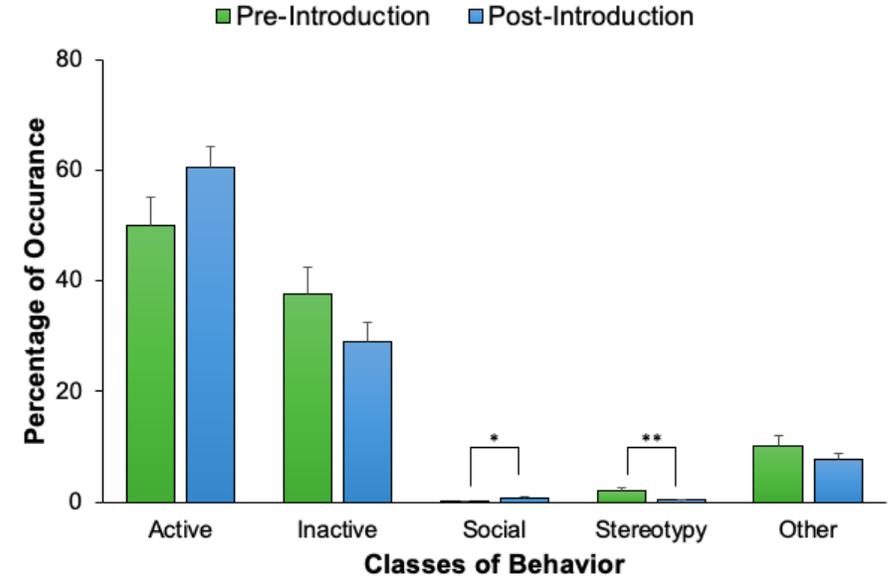


Condition 2B:
2 fur seals

Chiidax
Male, 8 years old

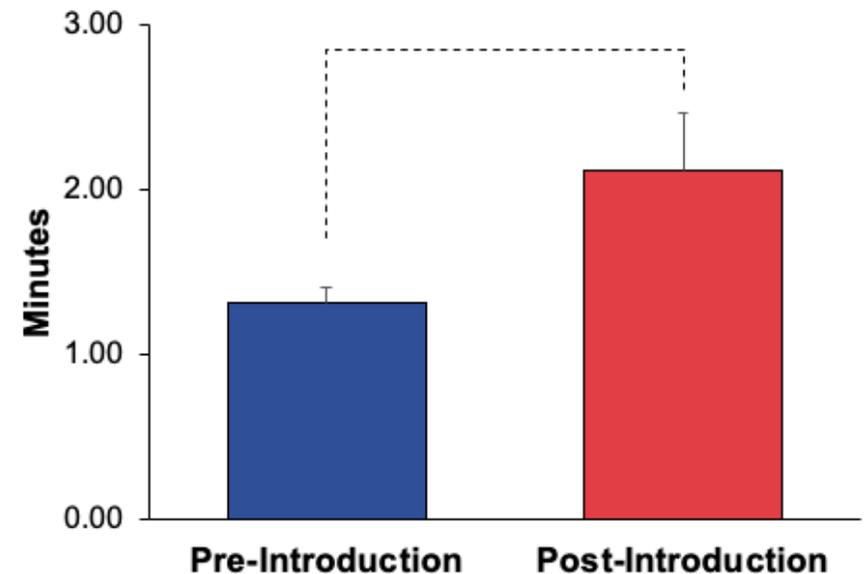
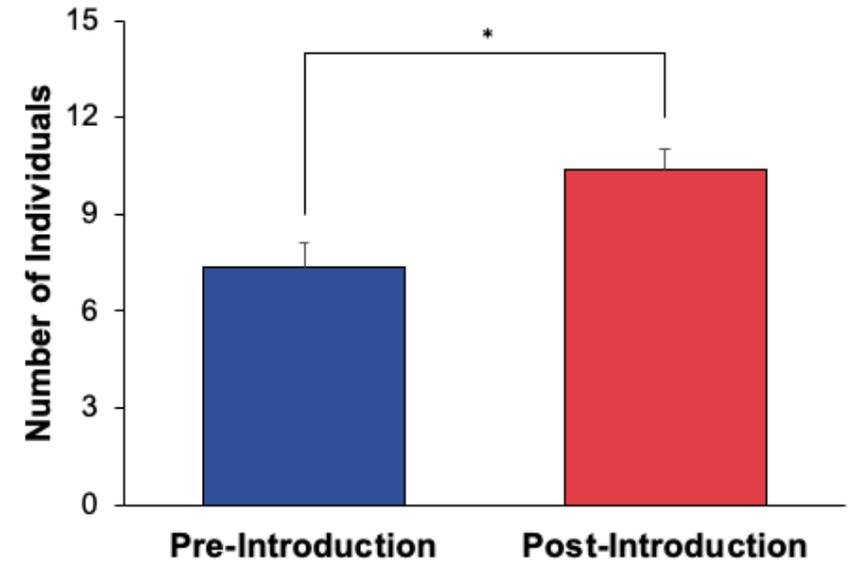
SEAL RESULTS:

- Post-introduction, Flaherty was more social.
 - #frend 😊
- Flaherty also spent less time circle swimming.
- The younger seal, Chiidax, was more active, and thus, less inactive.
- They were also more out of sight (Other).



VISITOR RESULTS:

- The introduction of the new seal had significant effects on crowd size.
- Overall, the size of the crowd increased with two fur seals present.
- We also saw changes in how long visitors stayed at the exhibit.
- While not significant, we saw an increase of almost double the length of stay time. (~1 min -> ~2 min)





FUTURE DIRECTIONS: EXPERIMENTAL DESIGNS

- Most AVI research is correlational (Fernandez & Chiew, 2021; Hosey, 2000).
- While we can put a focus on measuring visitor effects versus experiences, we do not KNOW the cause.
- We need more EXPERIMENTAL designs!
- For instance, modifying visitor presence or viewability (Chiew et al., 2019; O'Malley et al., 2021).



FUTURE DIRECTIONS: VISITOR EXPERIENCES

- The majority of AVI research has been focused on welfare effects (visitor effects).
- But changes in visitor behaviors and perceptions is equally important (both for educational and ‘keeping the doors open’ purposes!)
- This should include external (non-AVI) factors and how they influence interactions.
- For instance, the effects of signage and staff on visitor behavior (Tay et al., 2023).



FUTURE DIRECTIONS: POSITIVE INTERACTIONS

- Historically, most research has focused on the negative visitor effects on zoo primates.
- Now we are seeing an increase in non-primates, visitor experiences, and positive effects studied.
- Visitor interactions with animals (direct and indirect) are important (D’Cruze et al., 2019).
- Our focus should be on increasing **positive** HAIs in zoos and aquariums!

THANK YOU!

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QUESTIONS?

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