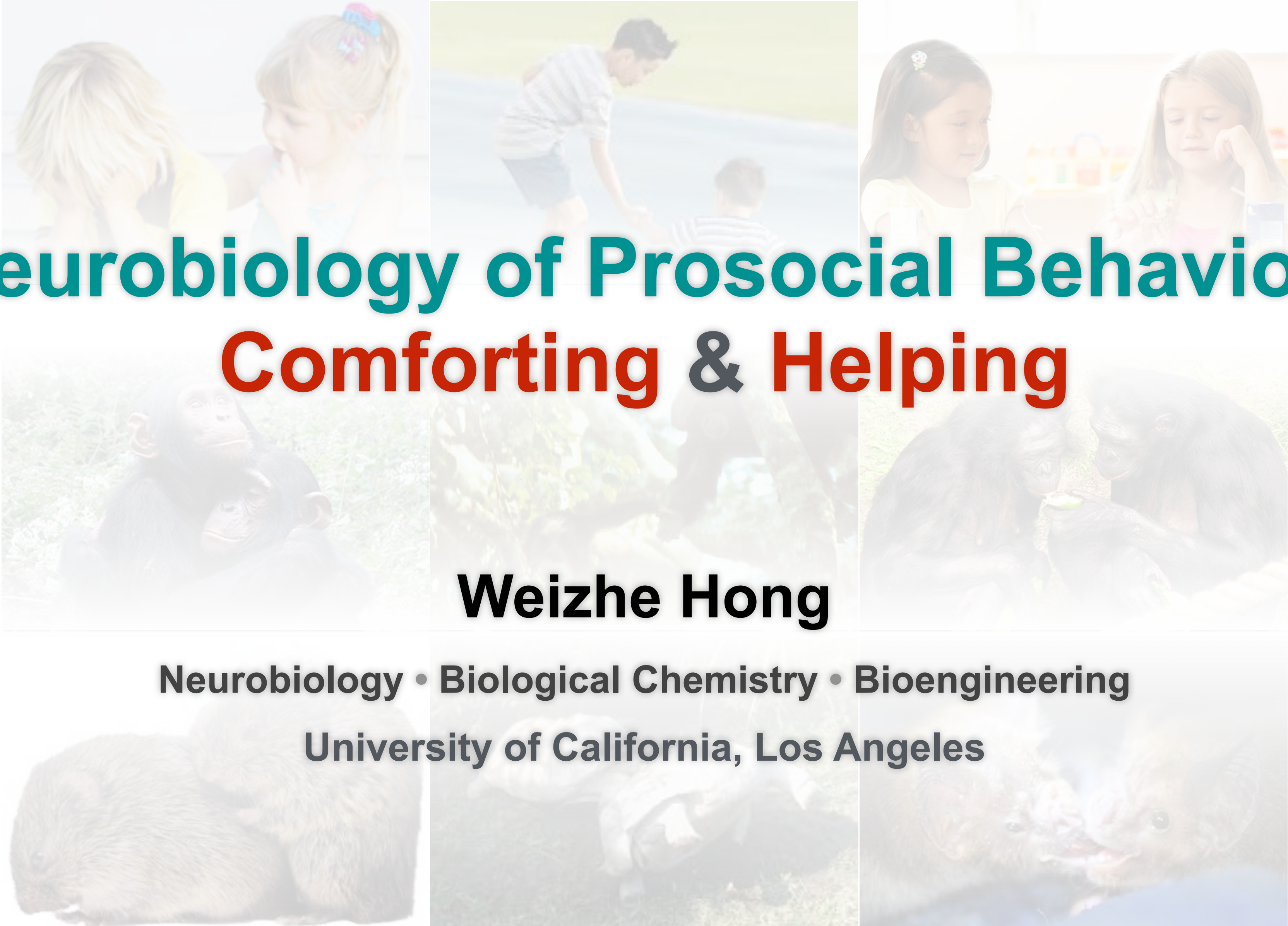




Neurobiology of Prosocial Behavior: Comforting & Helping

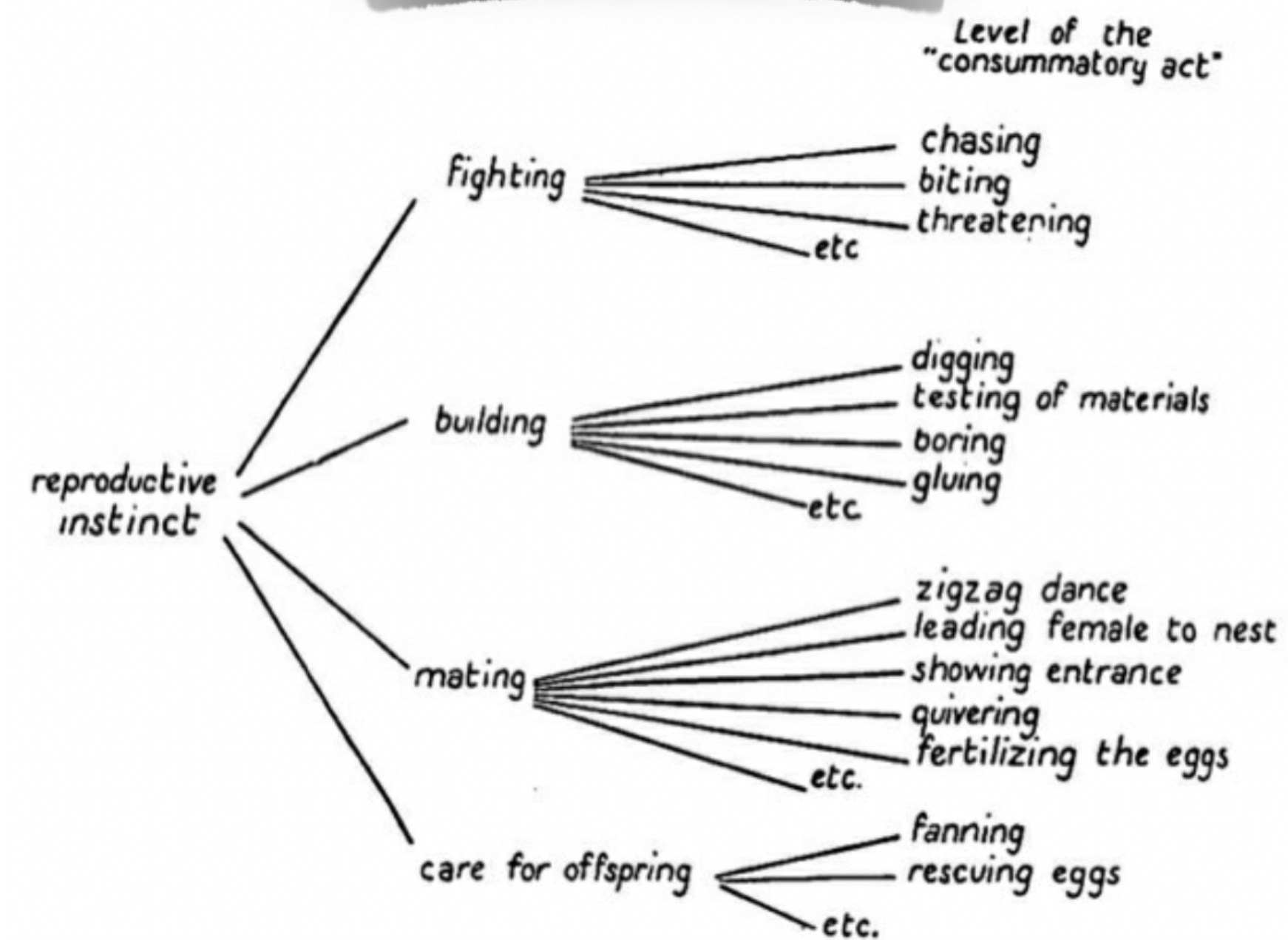
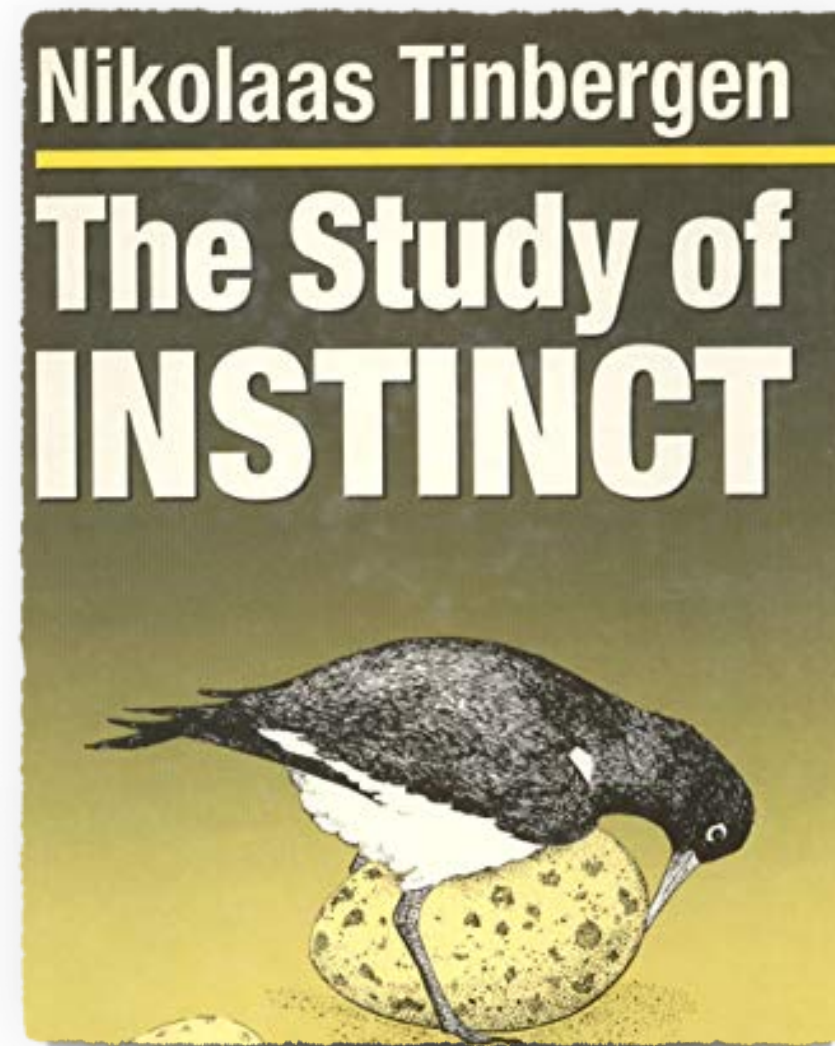
Weizhe Hong

Neurobiology • Biological Chemistry • Bioengineering

University of California, Los Angeles

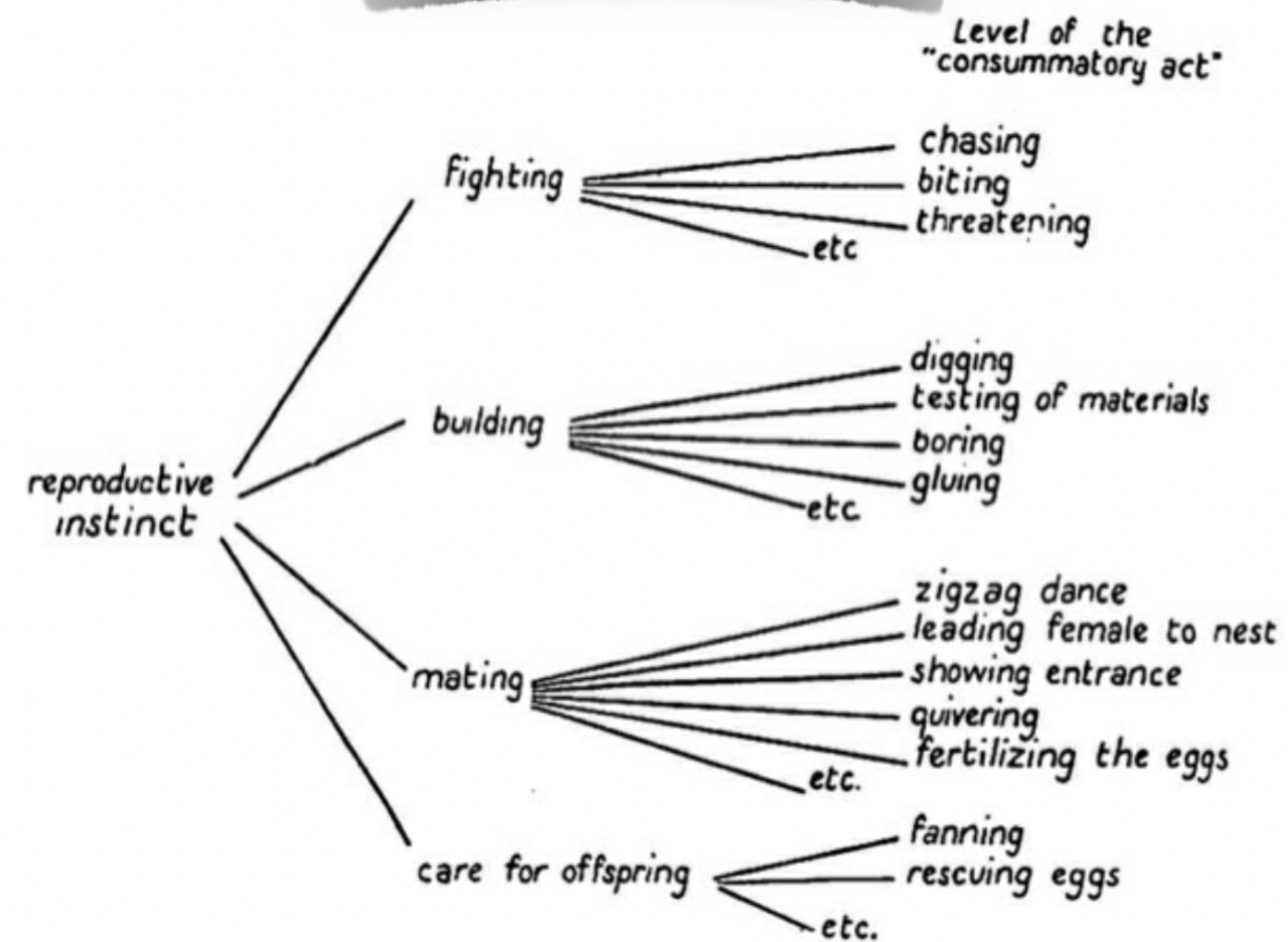
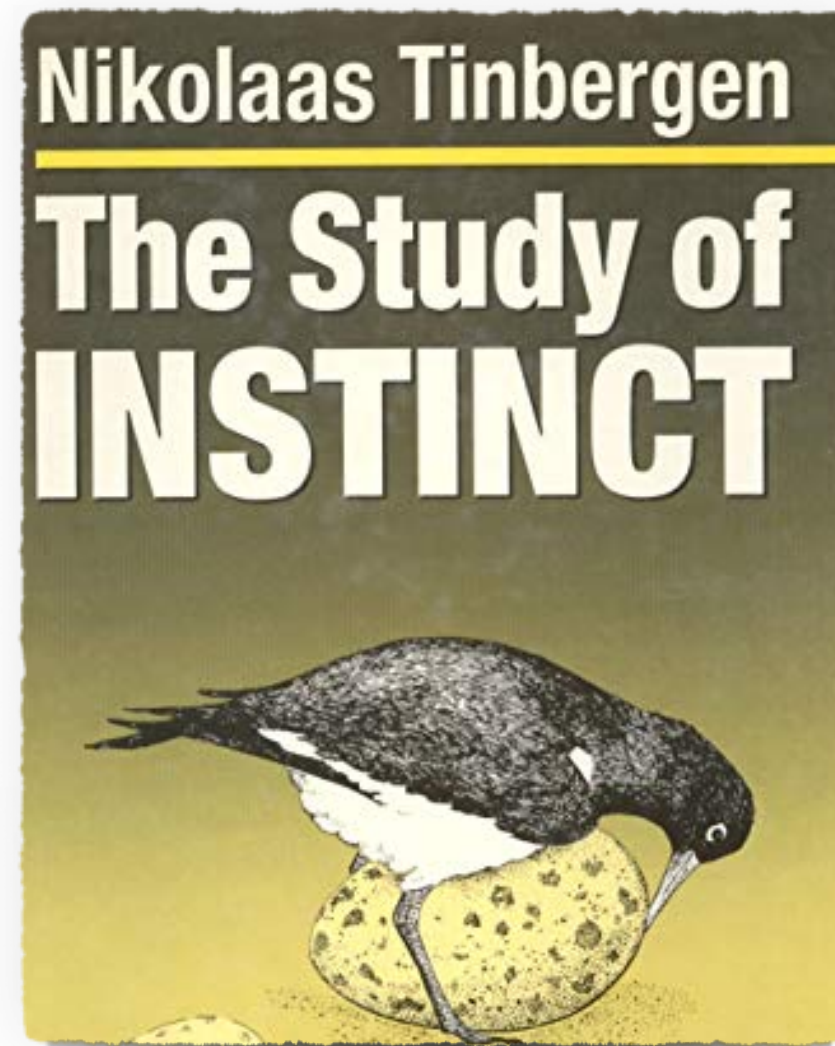
**All life forms exist to maximize
survival and reproduction**

Benefiting oneself



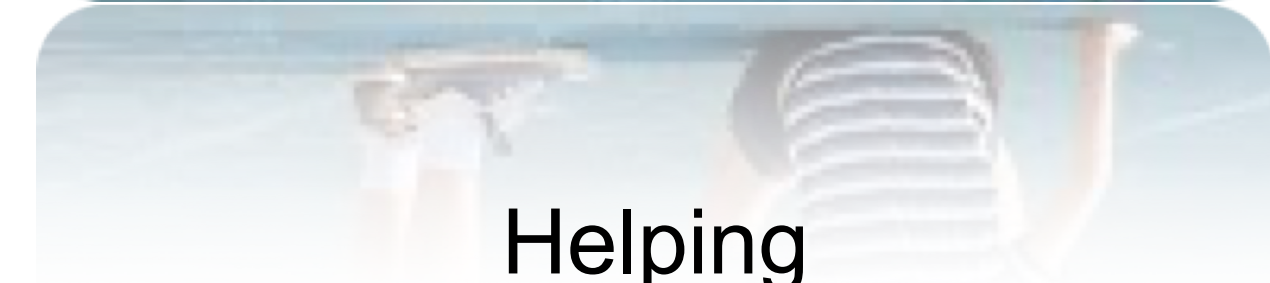
(Tinbergen, 1942)

Benefiting oneself

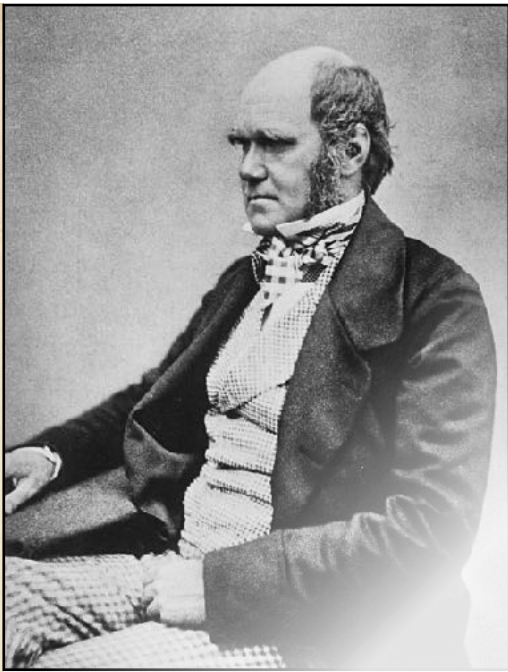
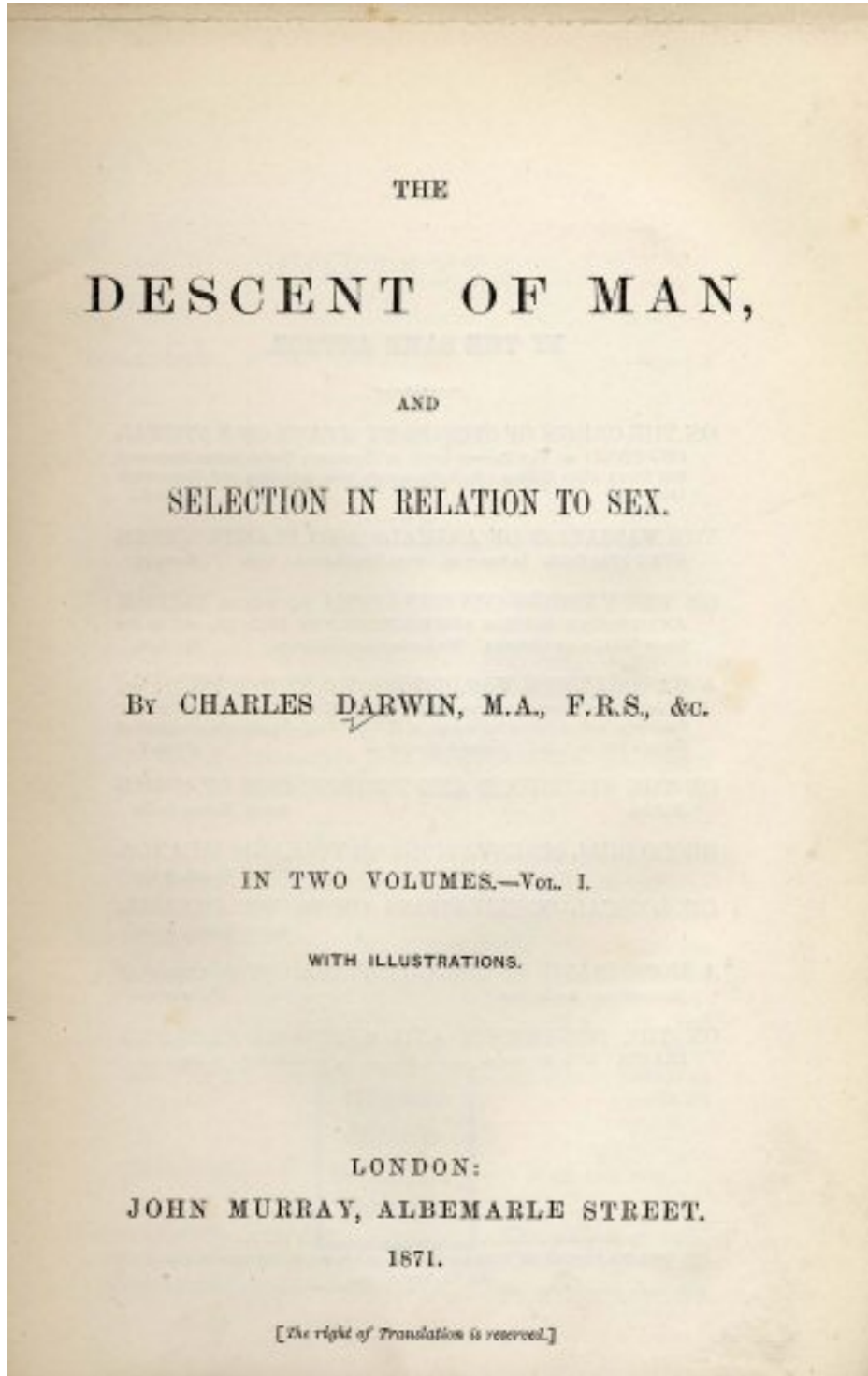


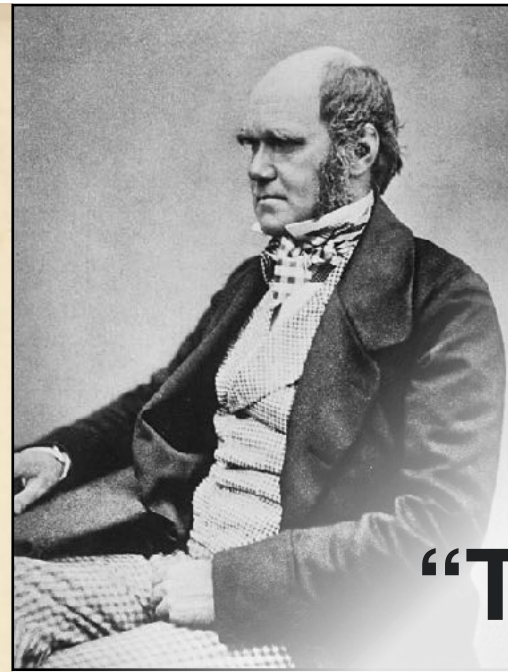
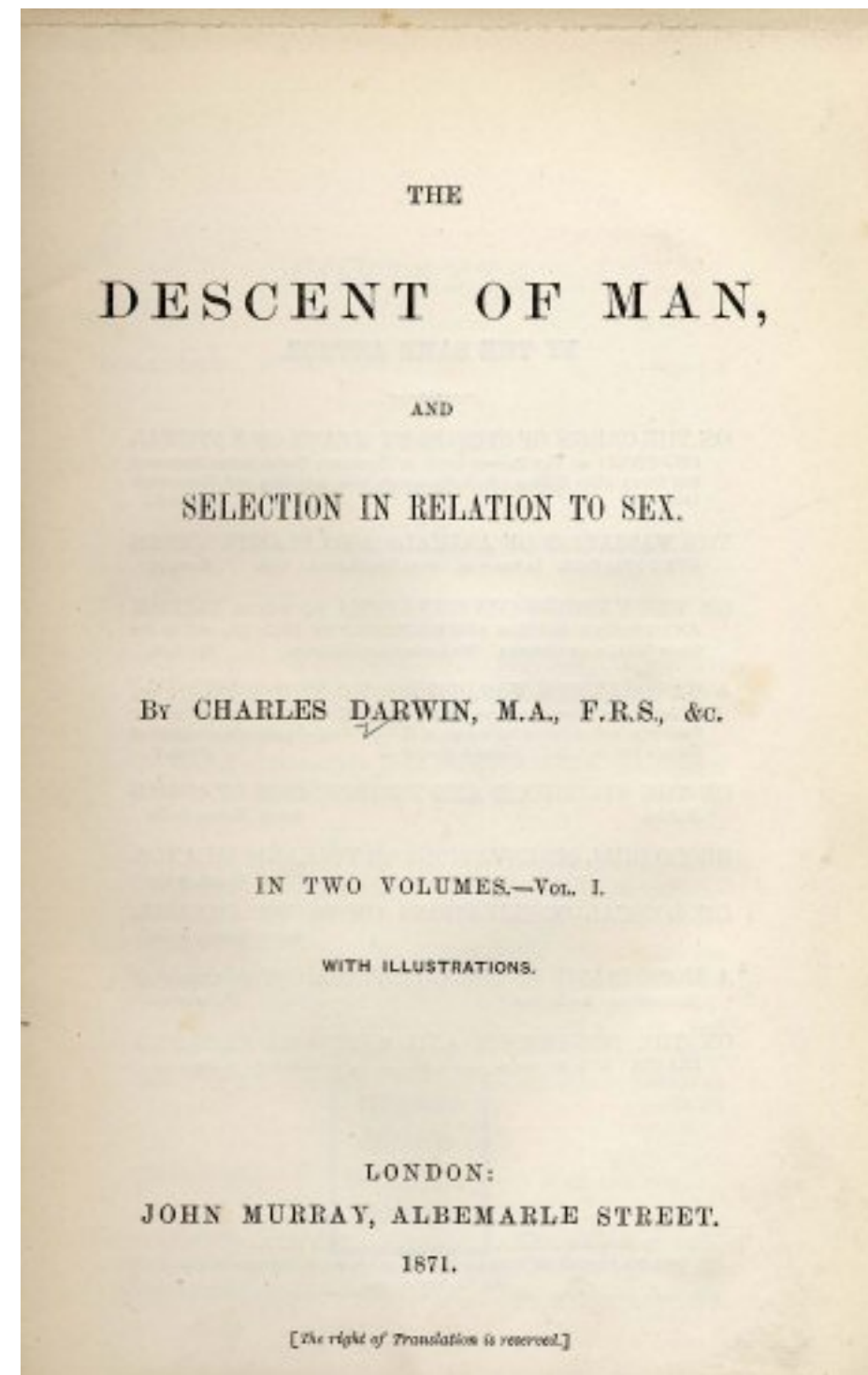
(Tinbergen, 1942)

Benefiting others



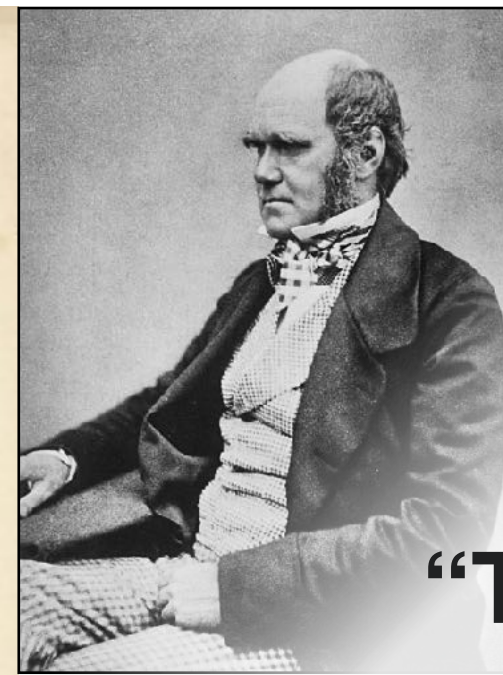
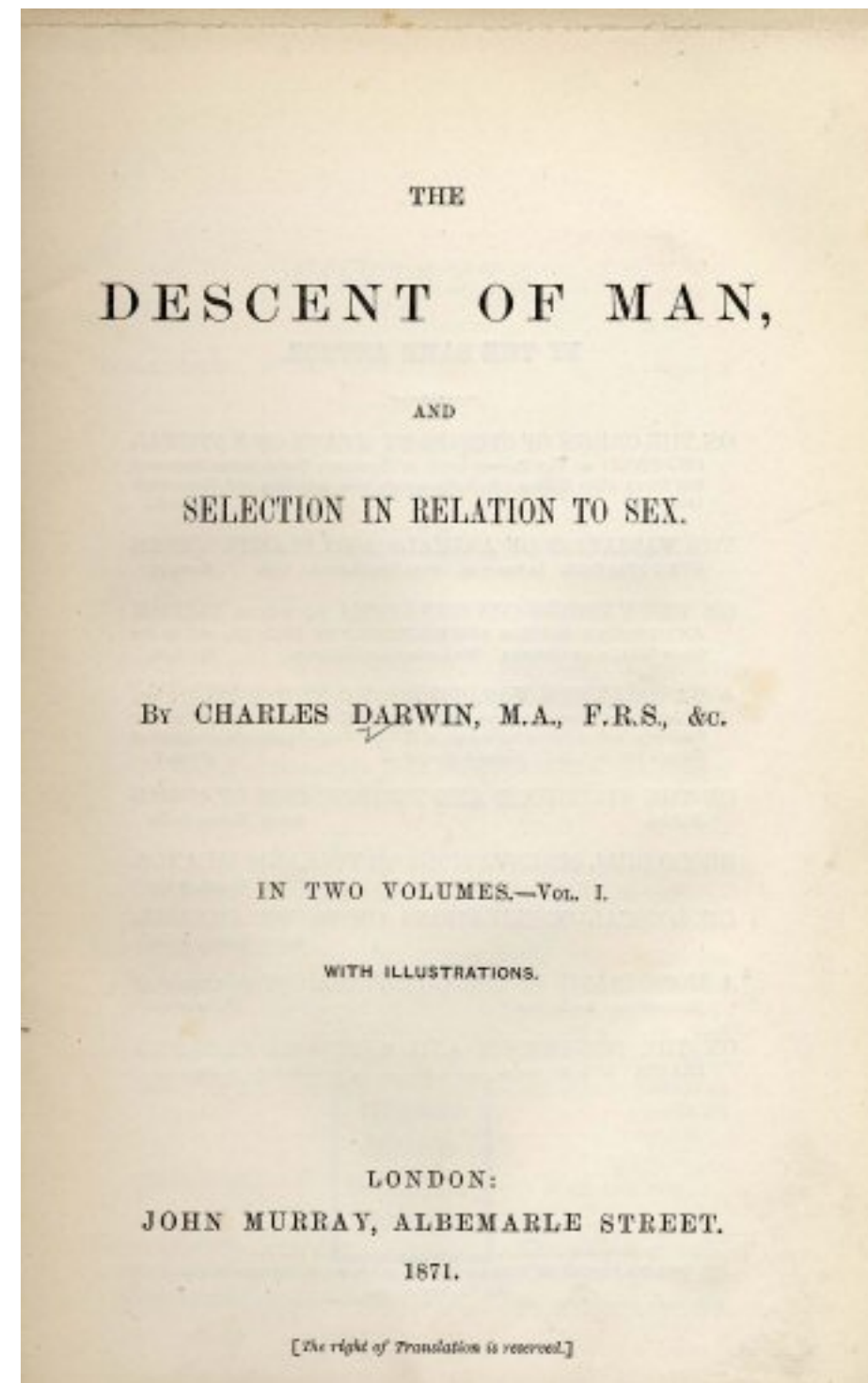
Helping
Sharing
Donating
Volunteering
Cooperating
Providing emotional support
Obeying society's rules
Complying with social conventions
Acts of bravery or heroism





“There can be no doubt that a tribe including many members who ... were always ready to **aid one another**, and to **sacrifice themselves for the common good**, would be **victorious over most other tribes**; and this would be natural selection.”

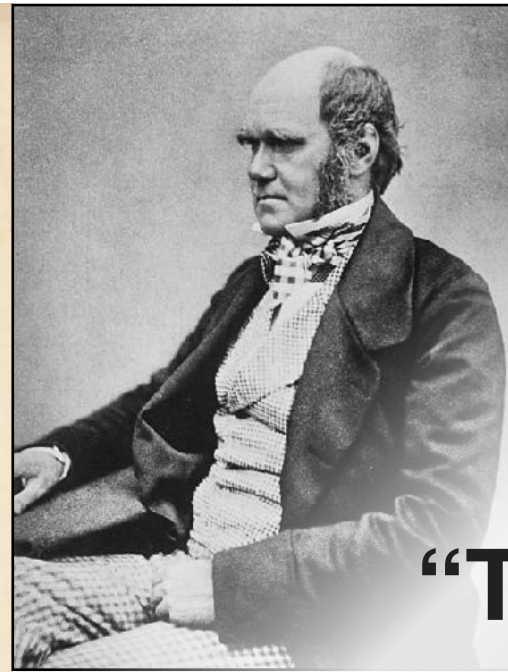
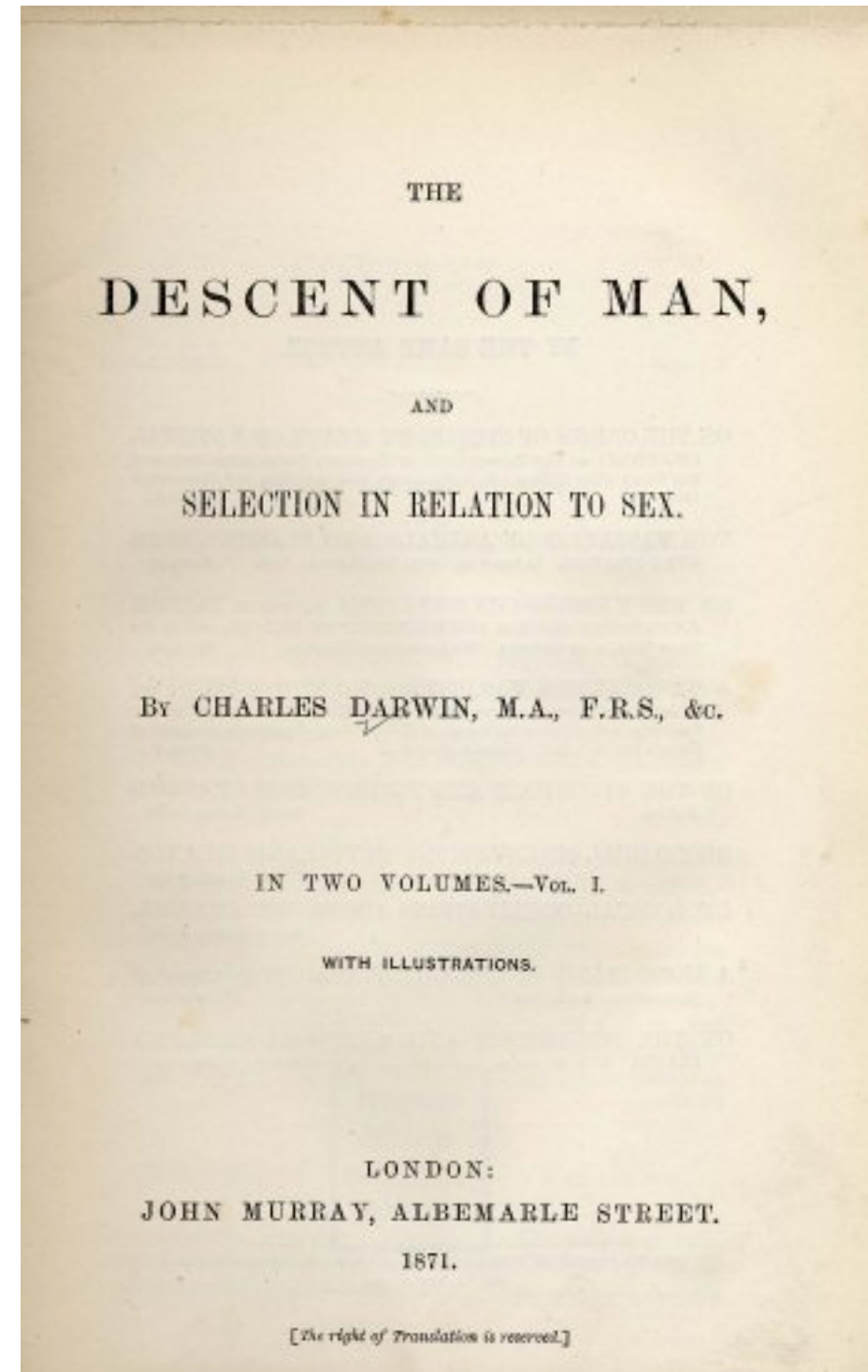
— The Descent of Man, Charles Darwin (1871)



“There can be no doubt that a tribe including many members who ... were always ready to **aid one another**, and to **sacrifice themselves for the common good**, would be **victorious over most other tribes**; and this would be natural selection.”

“He who was ready to sacrifice his life ... would often **leave no offspring** to inherit his noble nature.”

— The Descent of Man, Charles Darwin (1871)



“There can be no doubt that a tribe including many members who ... were always ready to **aid one another**, and to **sacrifice themselves for the common good**, would be **victorious over most other tribes**; and this would be natural selection.”

“He who was ready to sacrifice his life ... would often **leave no offspring** to inherit his noble nature.”

— The Descent of Man, Charles Darwin (1871)

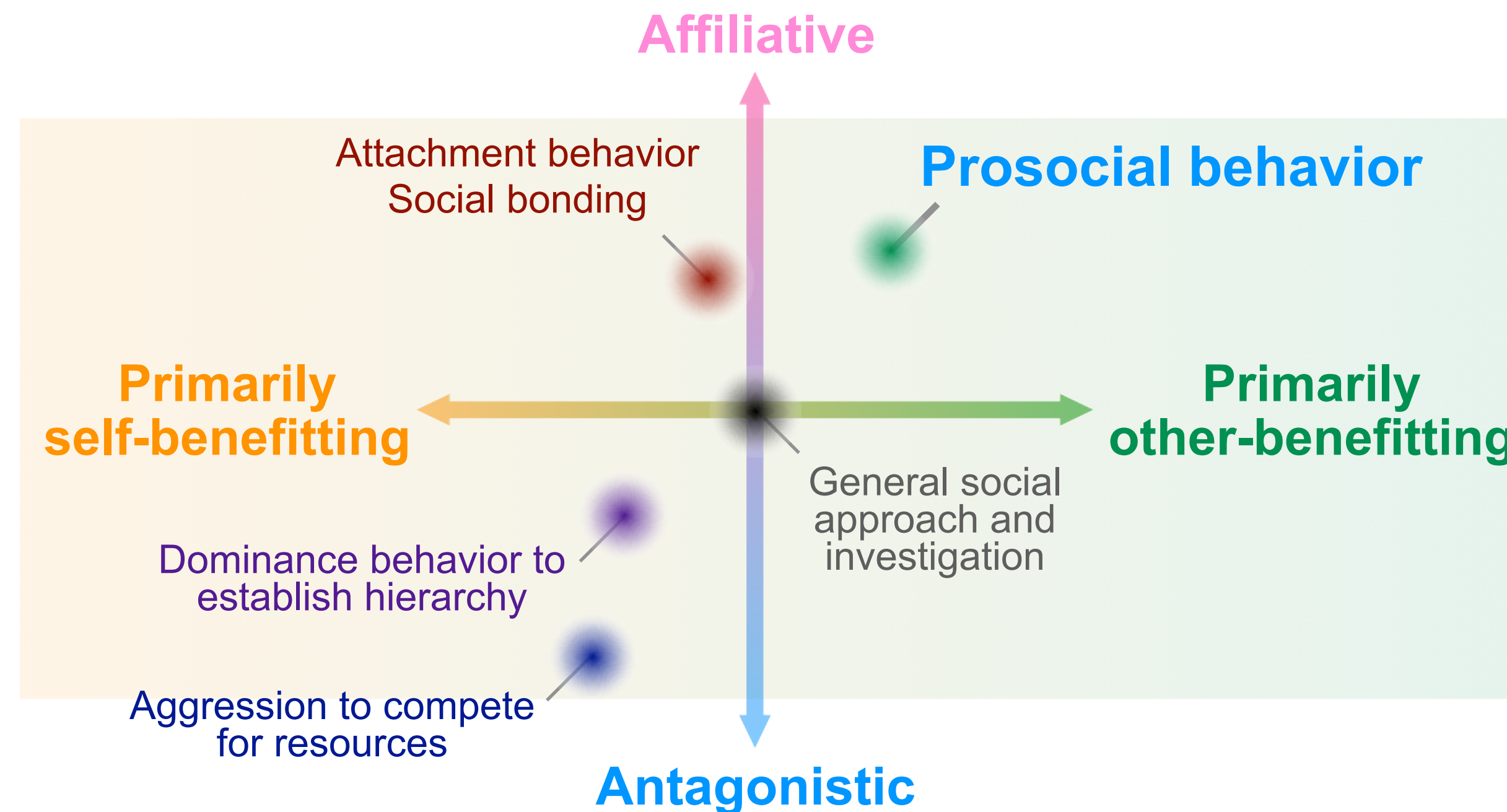
- Why and how do humans and other species behave in ways that benefit others?
- At the level of an individual, what mechanisms motivate these behaviors?

Prosocial behavior — the behaviors that benefit others

- **It occurs in response to a distressed state and/or need in another individual**
- **It helps to alleviate the distress and/or need in the recipient**

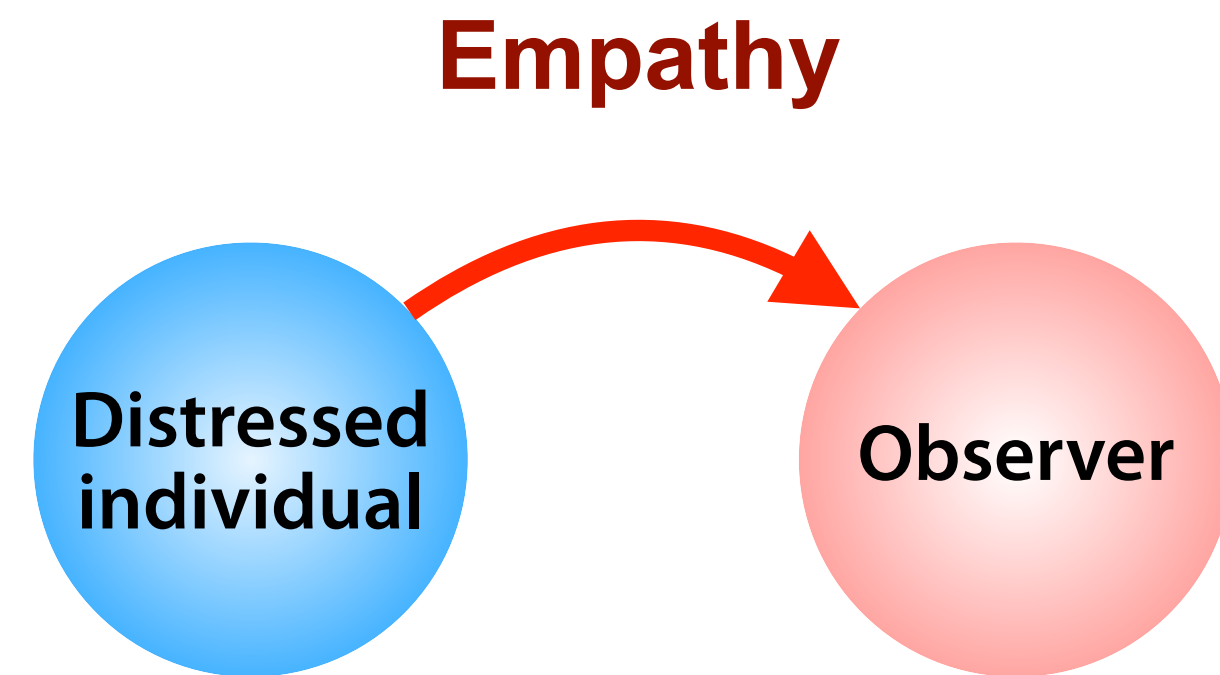
Prosocial behavior — the behaviors that benefit others

- It occurs in response to a distressed state and/or need in another individual
- It helps to alleviate the distress and/or need in the recipient



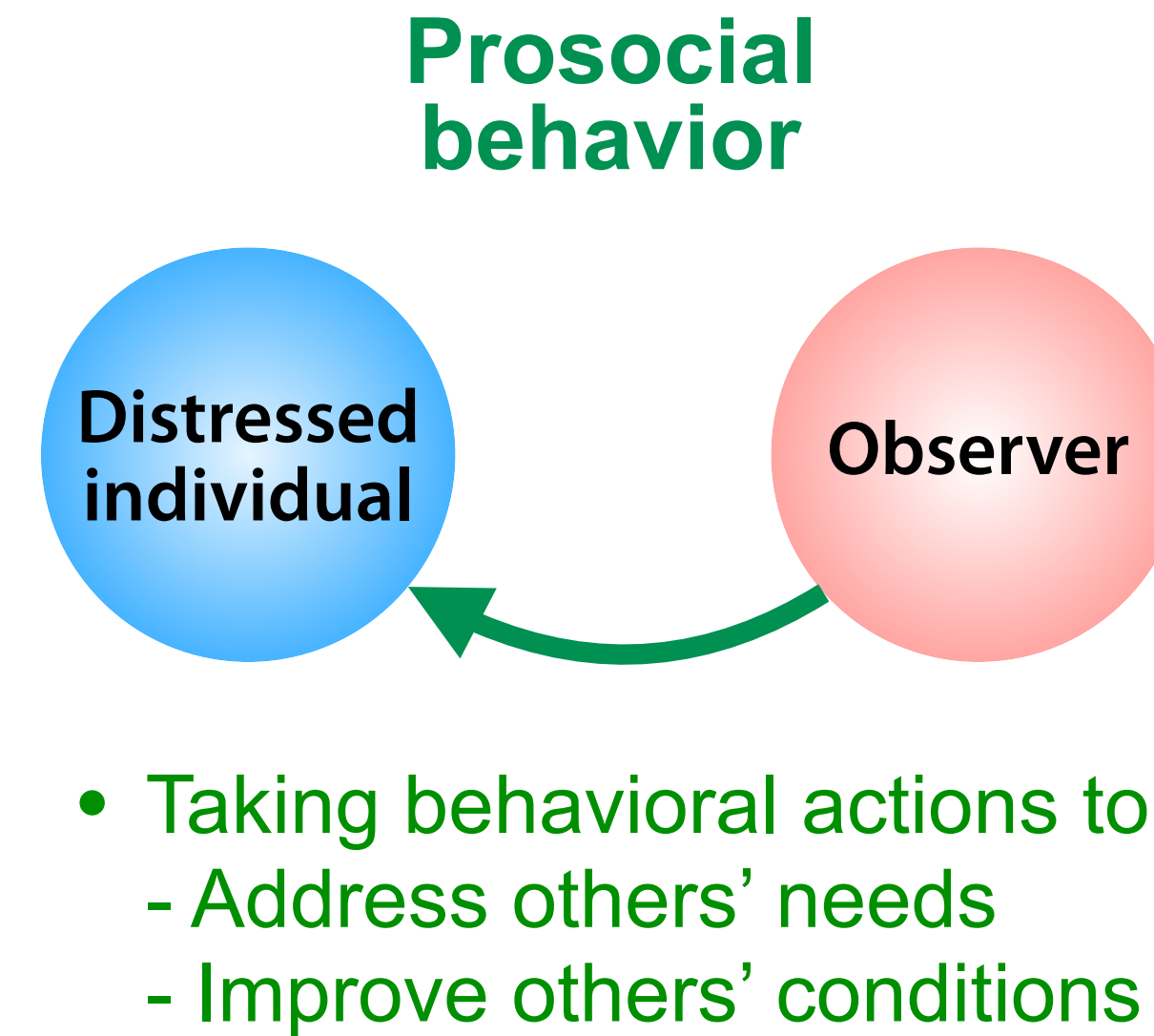
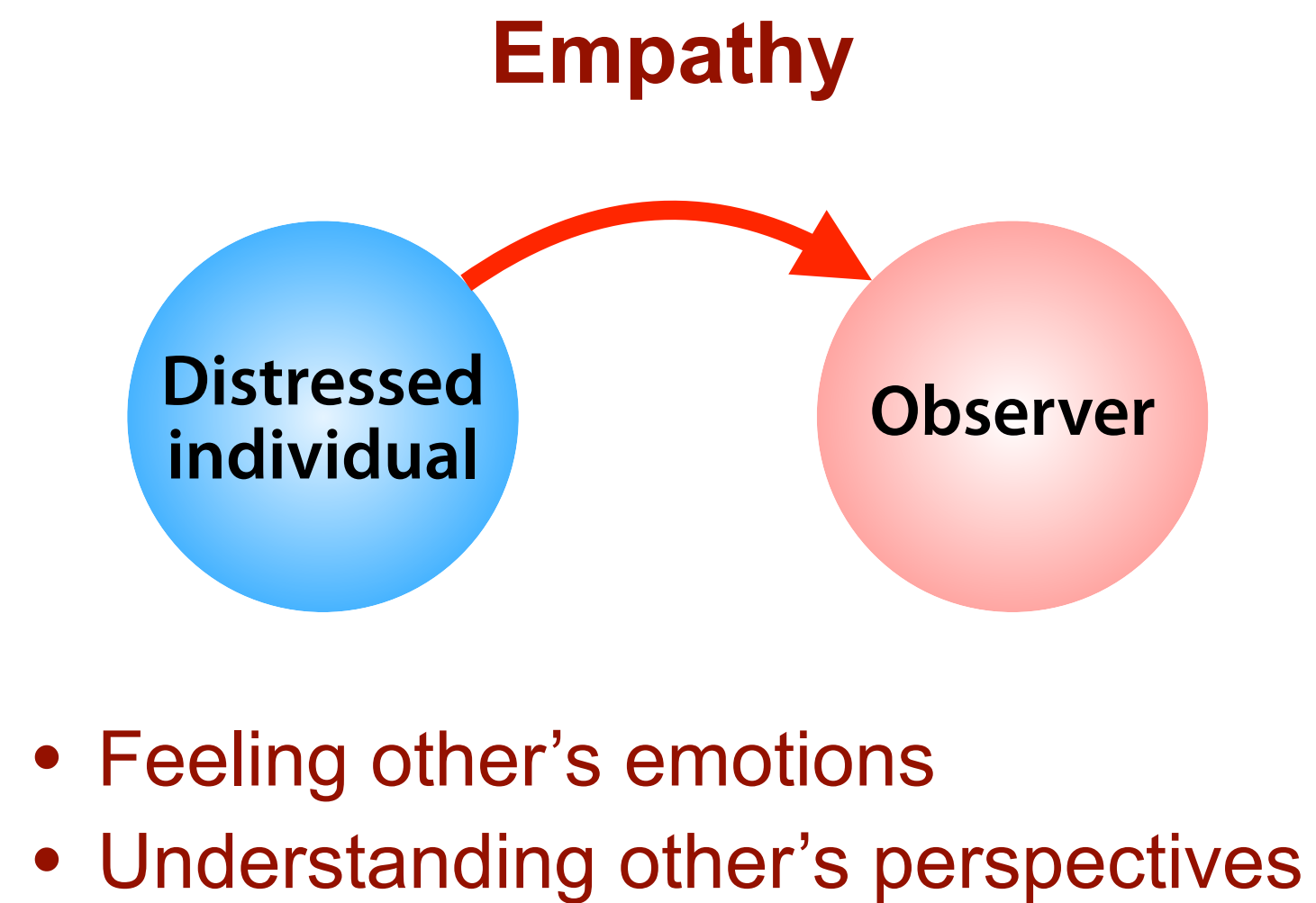
- It is not simply an affiliative behavior (it is not just friendly social behavior)
- It needs to be aimed at benefitting others

Empathy and Prosocial behavior are distinct concepts

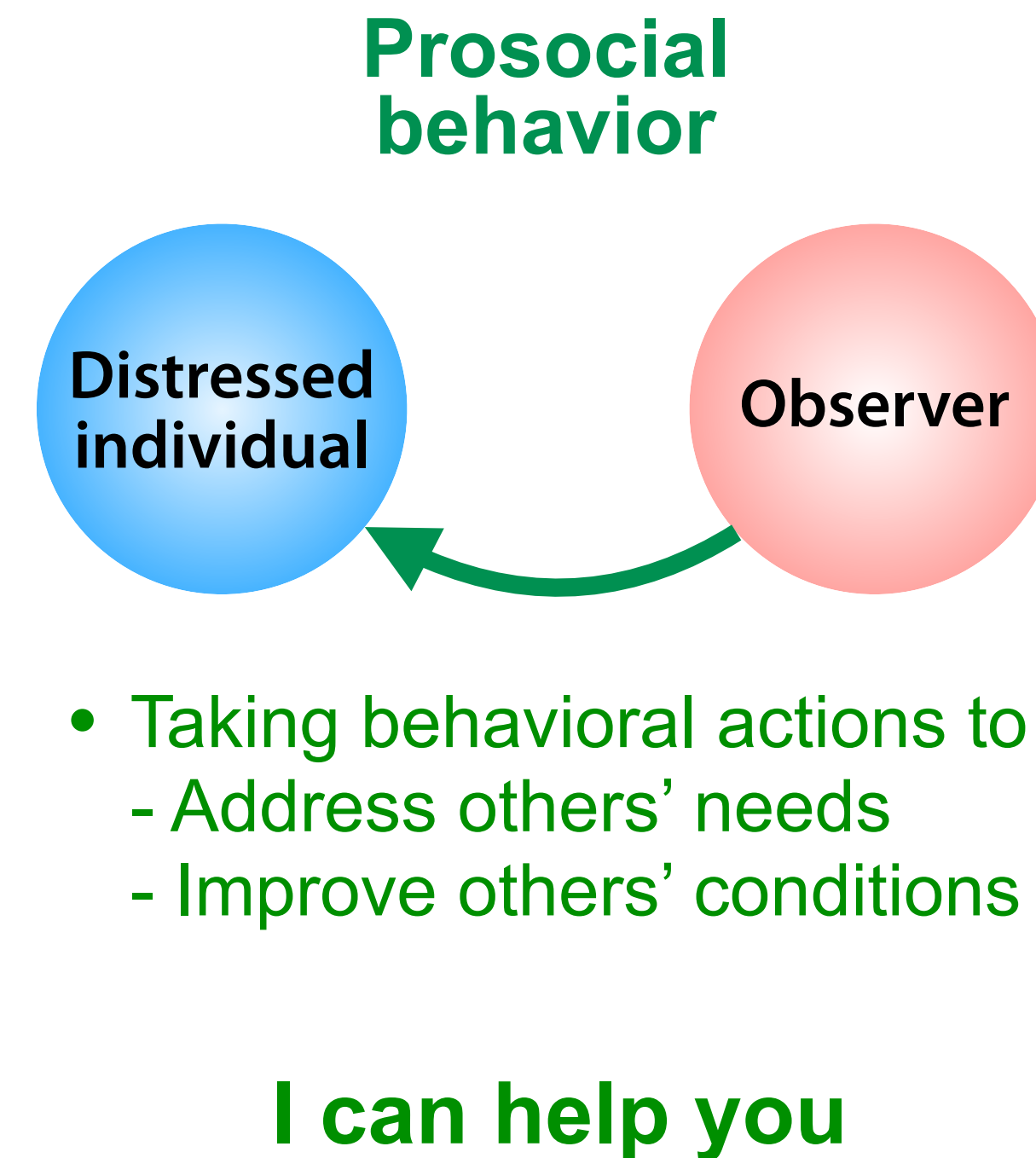
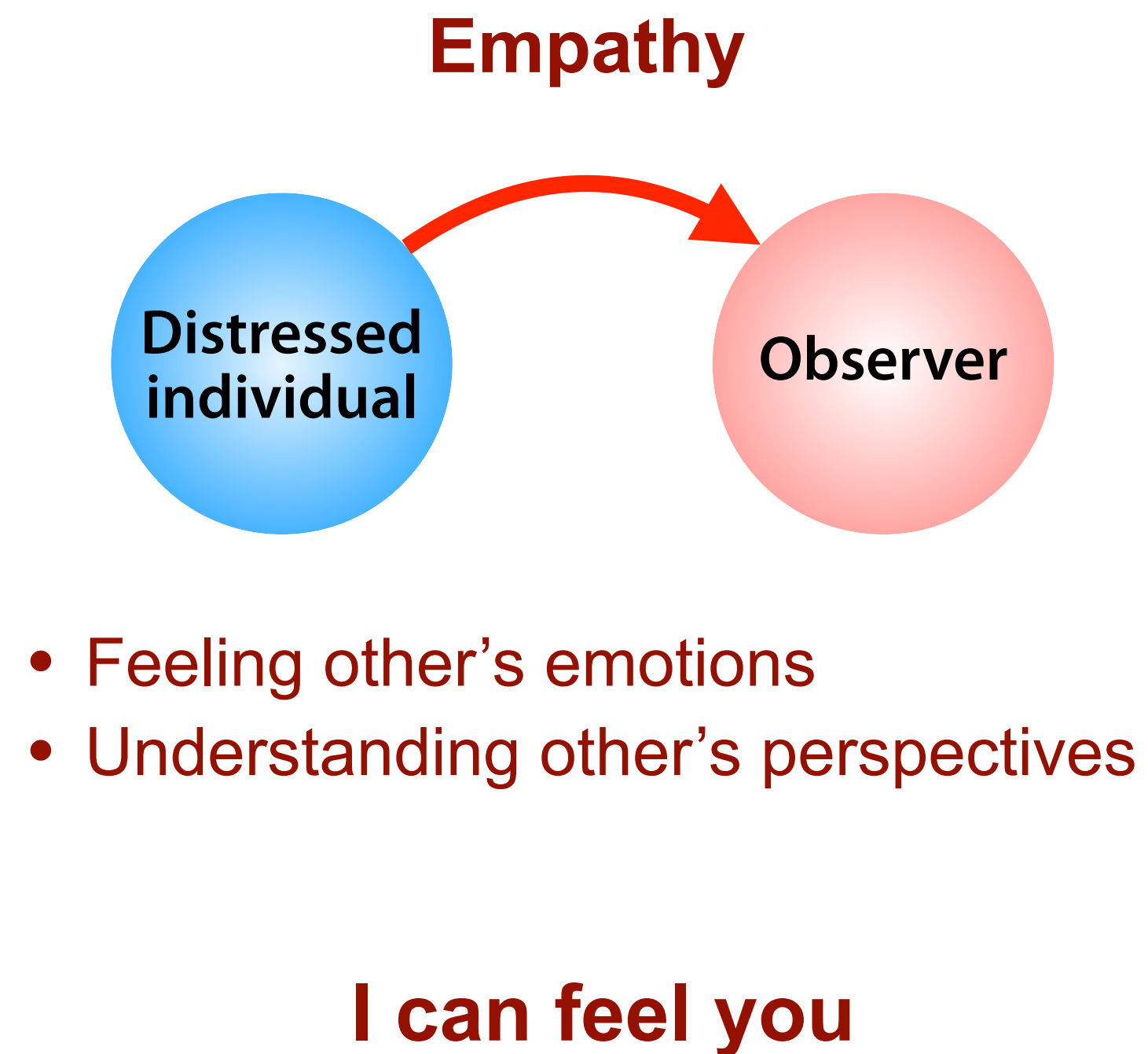


- Feeling other's emotions
- Understanding other's perspectives

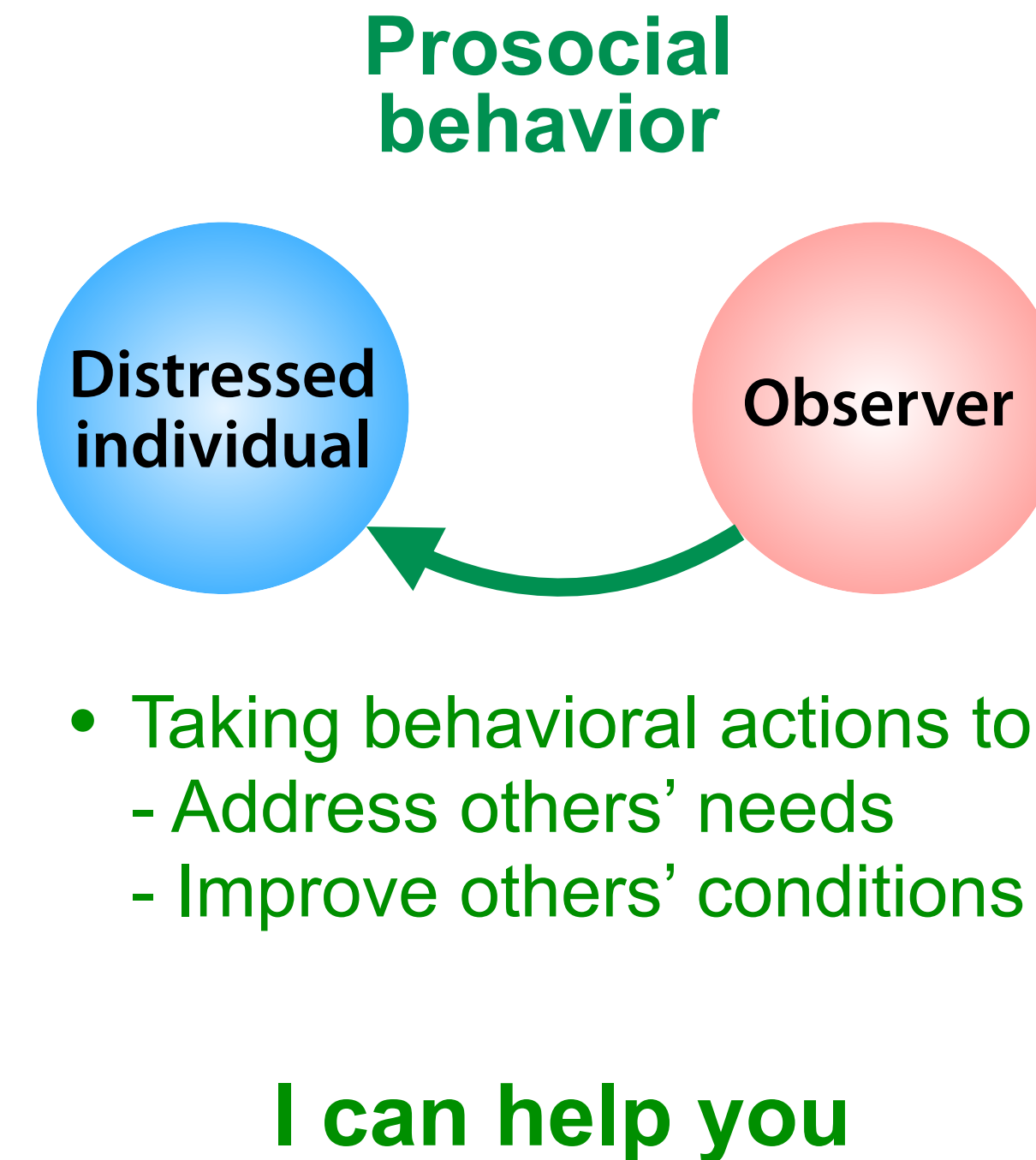
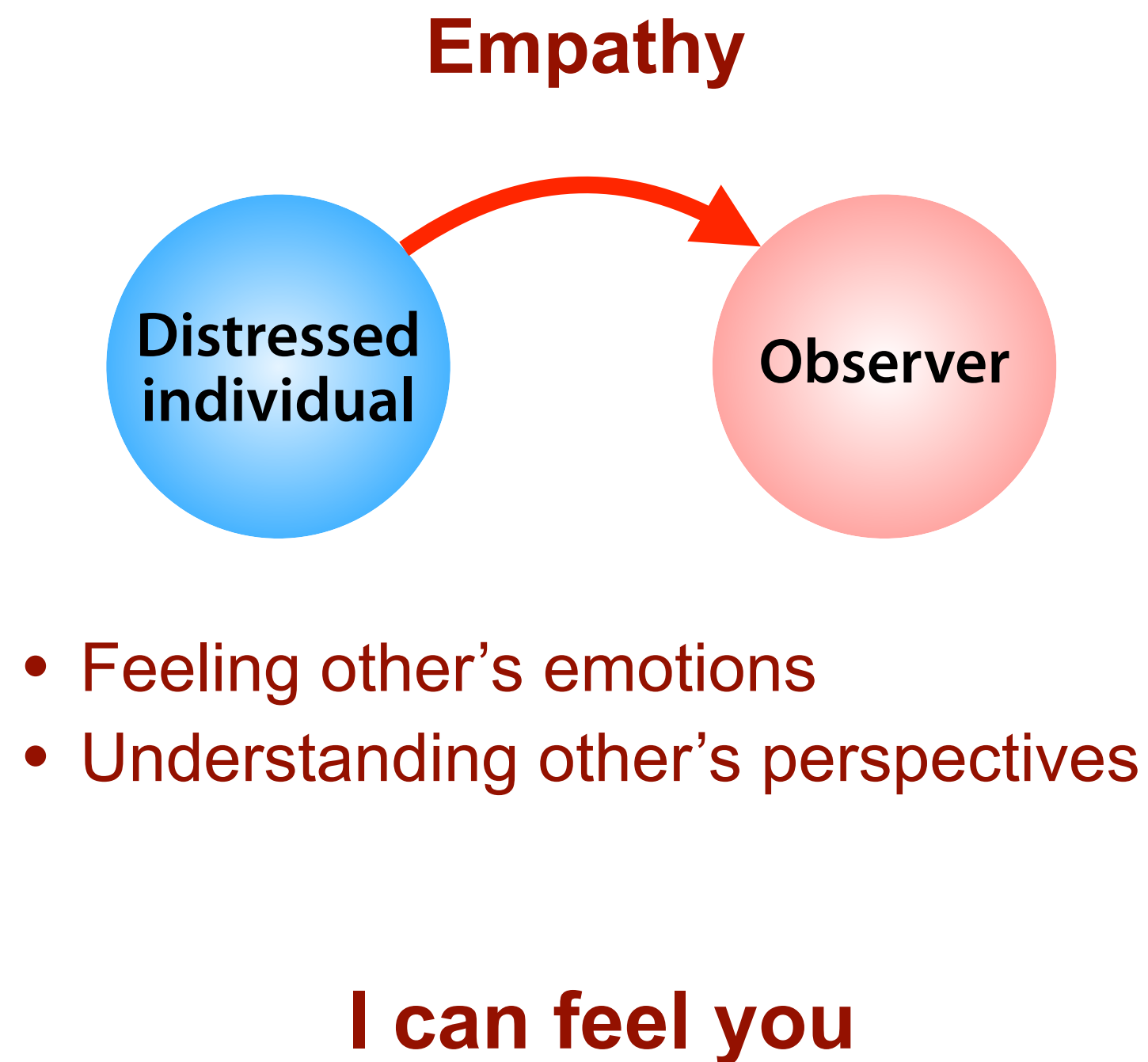
Empathy and Prosocial behavior are distinct concepts



Empathy and Prosocial behavior are distinct concepts

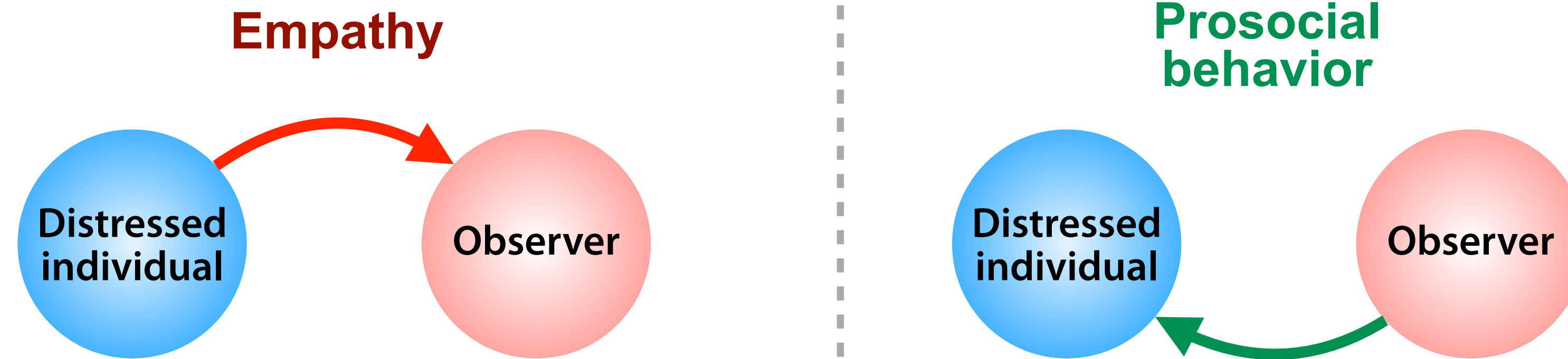


Empathy and Prosocial behavior are distinct concepts



- **Prosocial behavior - an important step beyond feeling and understanding others**
- **Feeling and understanding others would have limited value to those in need, if observers do not take actions to provide assistance and address the needs**

Major questions



Major questions

- How does an individual perceive the needs of others?

Major questions

- How does an individual perceive the needs of others?
- Perception → prosocial action to help and benefit others?

Major questions

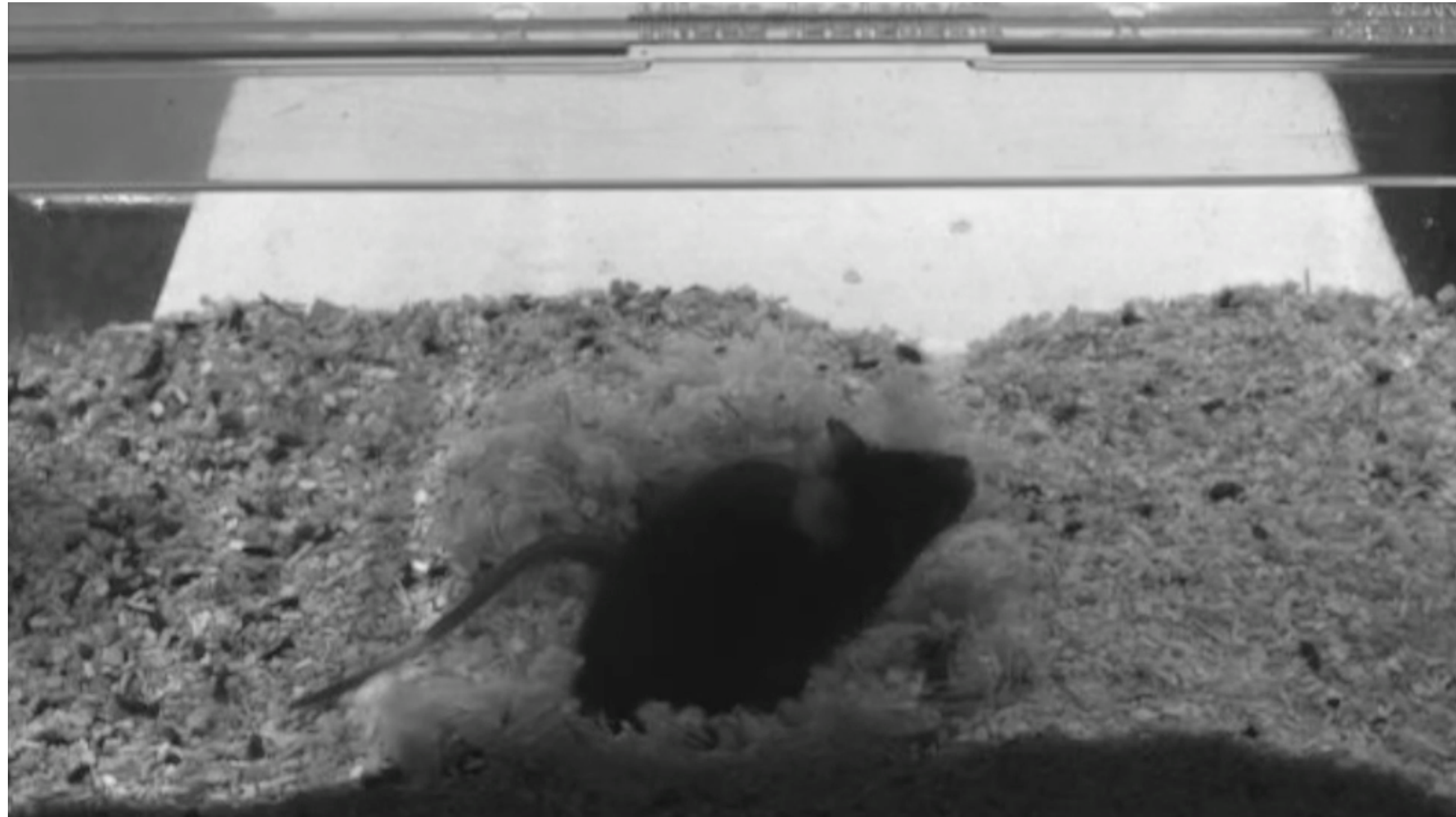
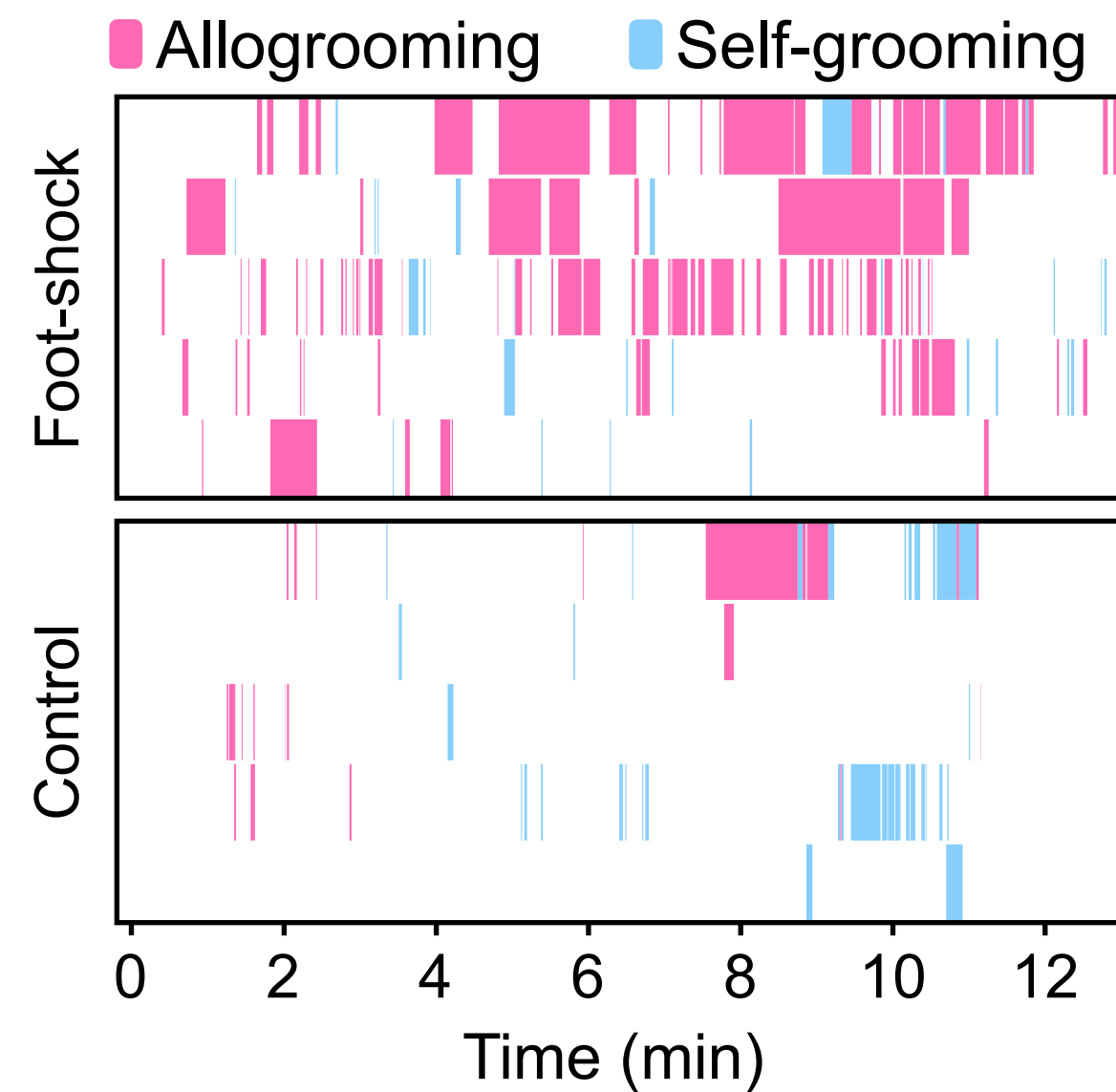
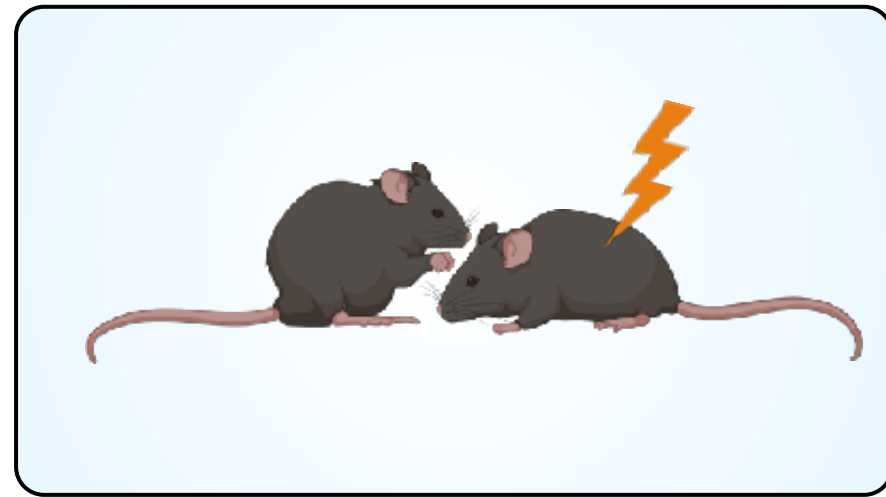
- How does an individual perceive the needs of others?
- Perception → prosocial action to help and benefit others?
- How does prosocial behavior benefit the recipients?

Major questions

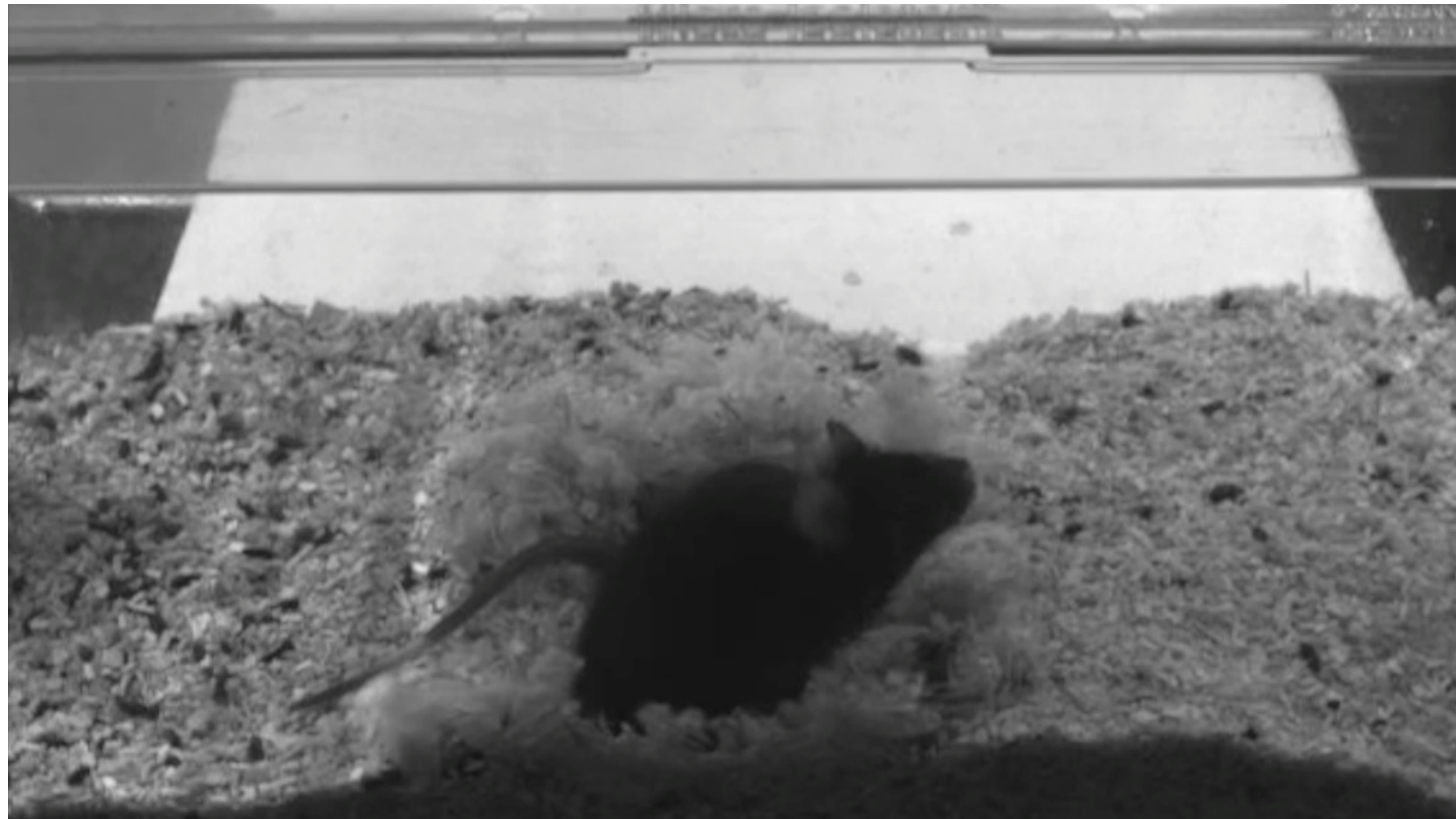
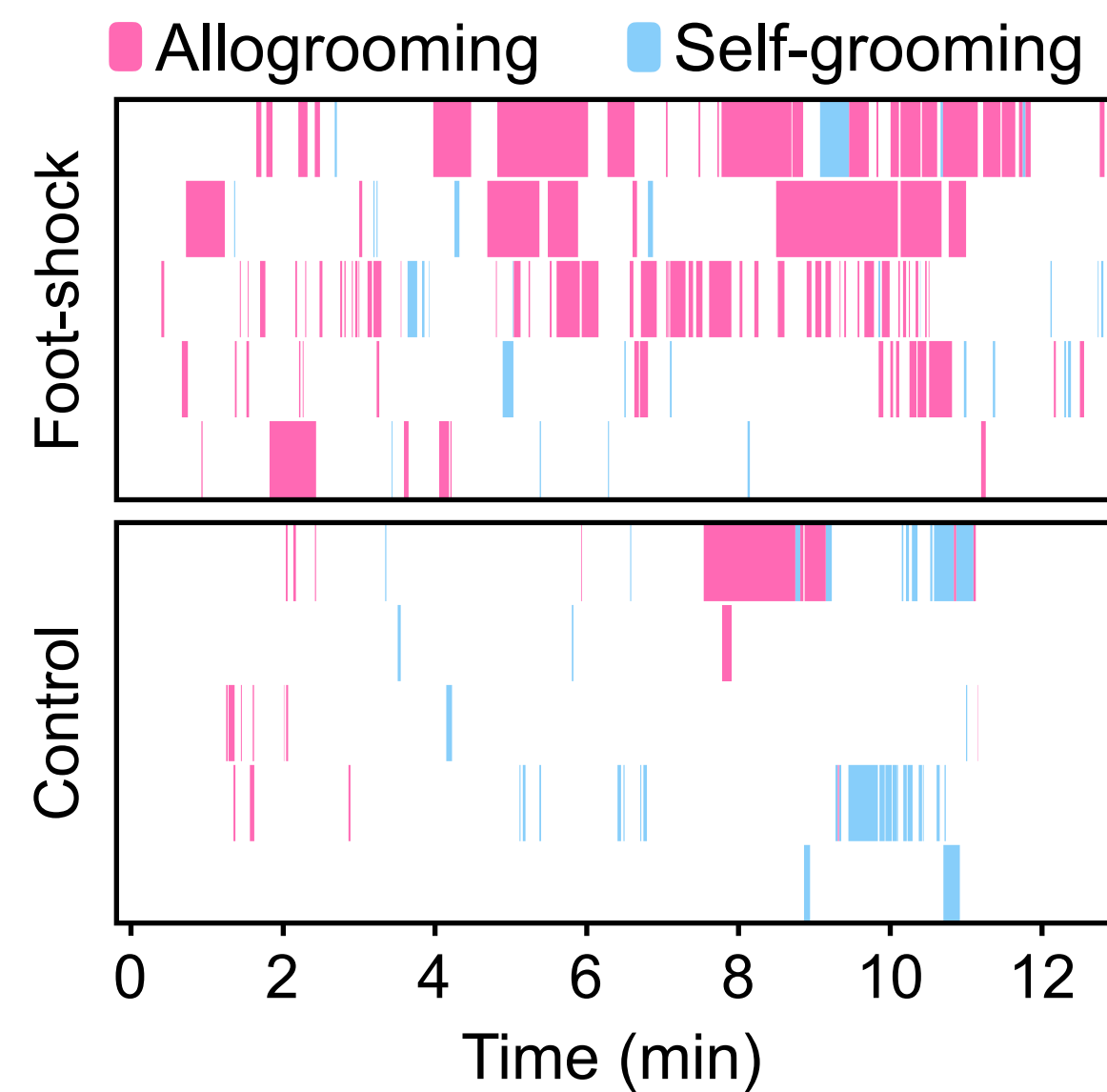
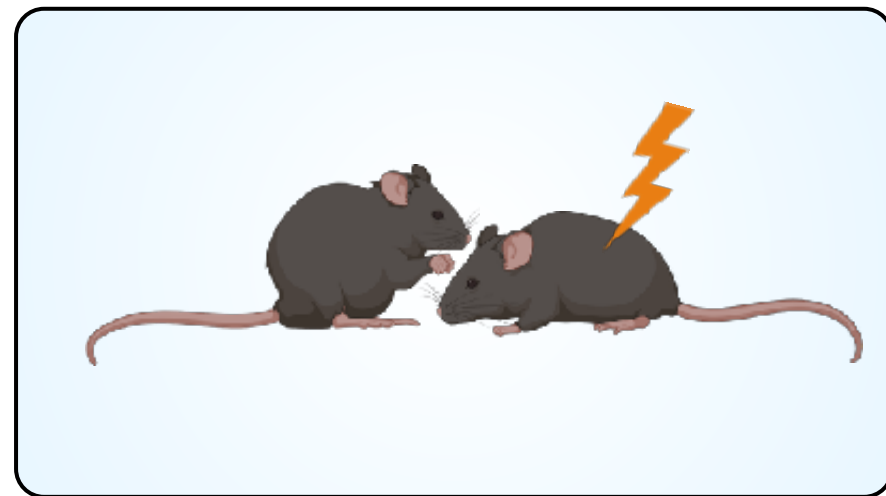
- How does an individual perceive the needs of others?
- Perception → prosocial action to help and benefit others?
- How does prosocial behavior benefit the recipients?
- A lack of robust behavioral models in an animal species that
 - (1) displays ethologically relevant prosocial behavior
 - (2) permits an in-depth dissection of the underlying mechanisms

Comforting behavior:

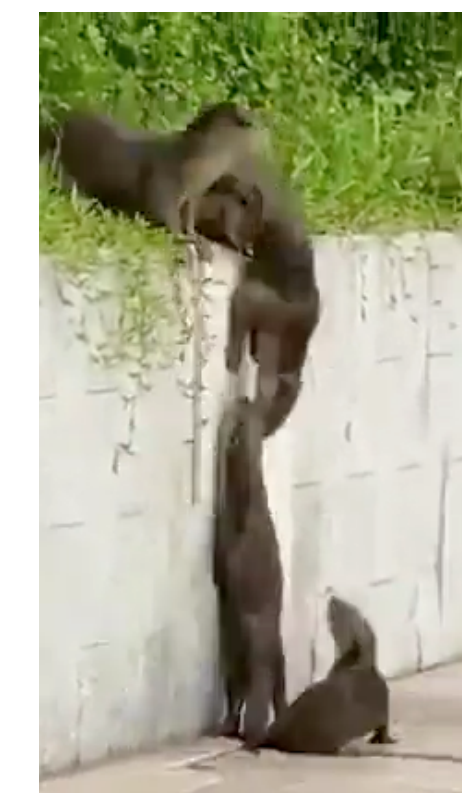
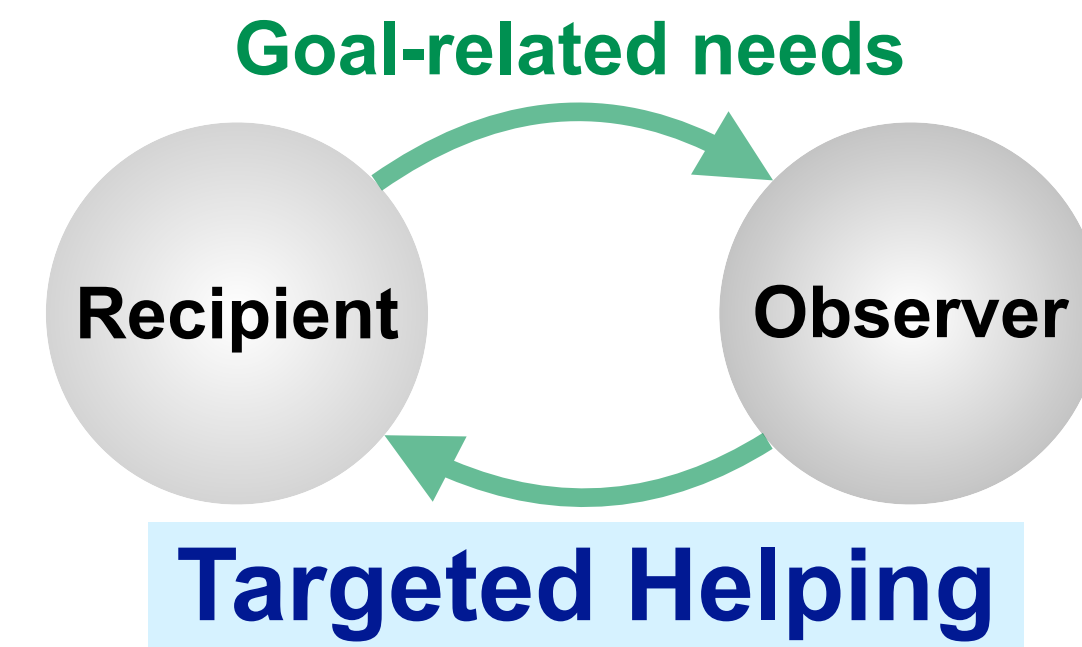
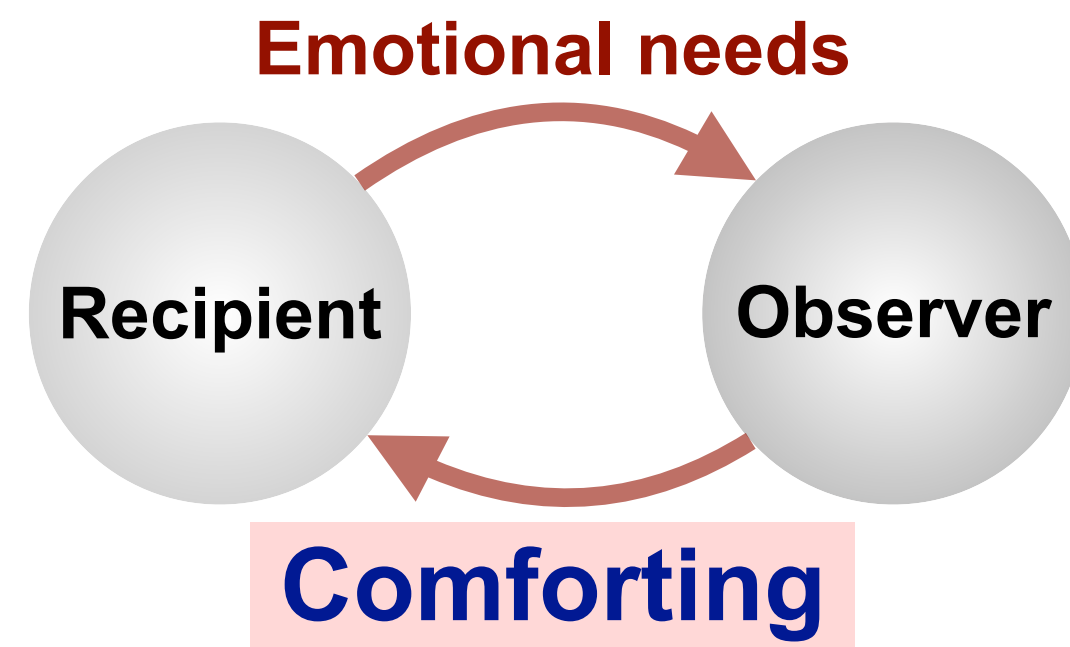
Mice increase social touch (allogrooming) toward stressed mice



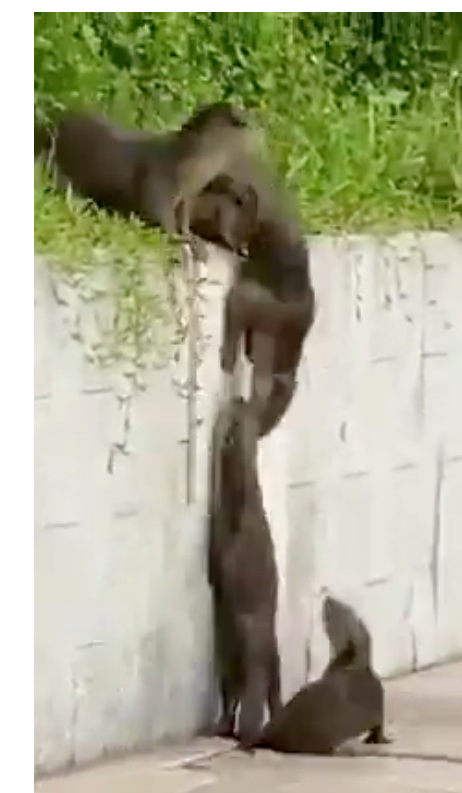
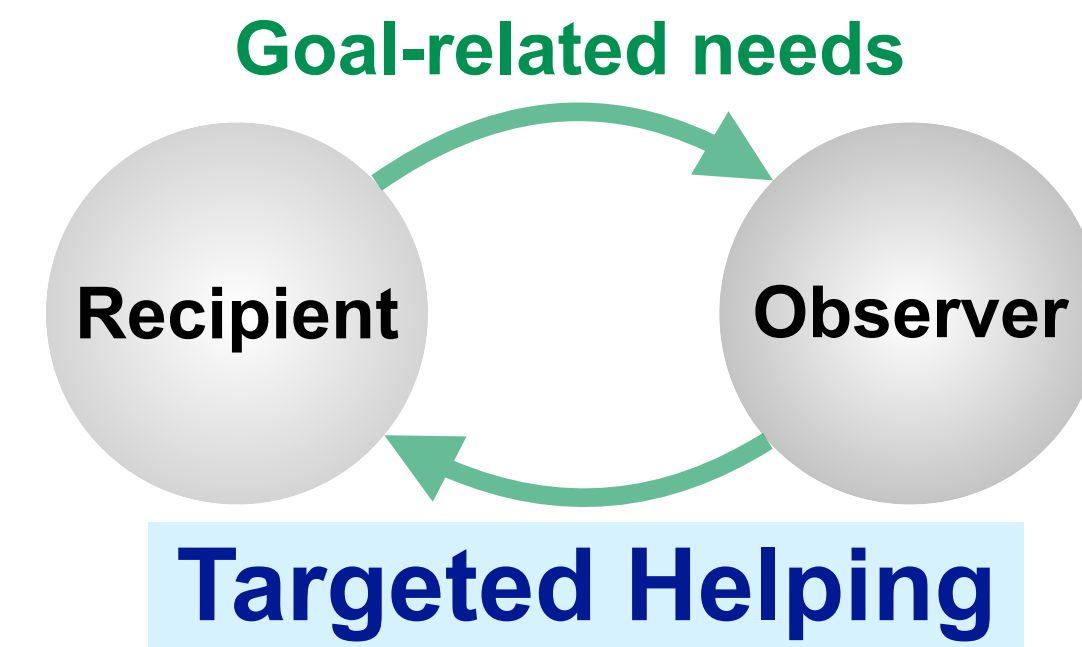
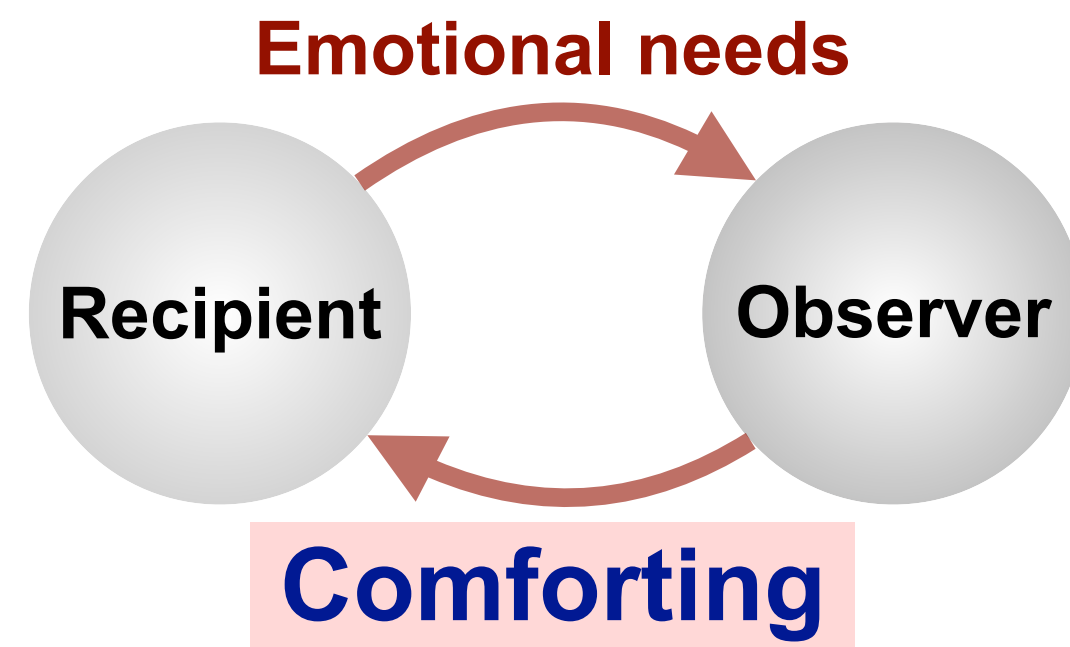
Comforting behavior: Mice increase social touch (allogrooming) toward stressed mice



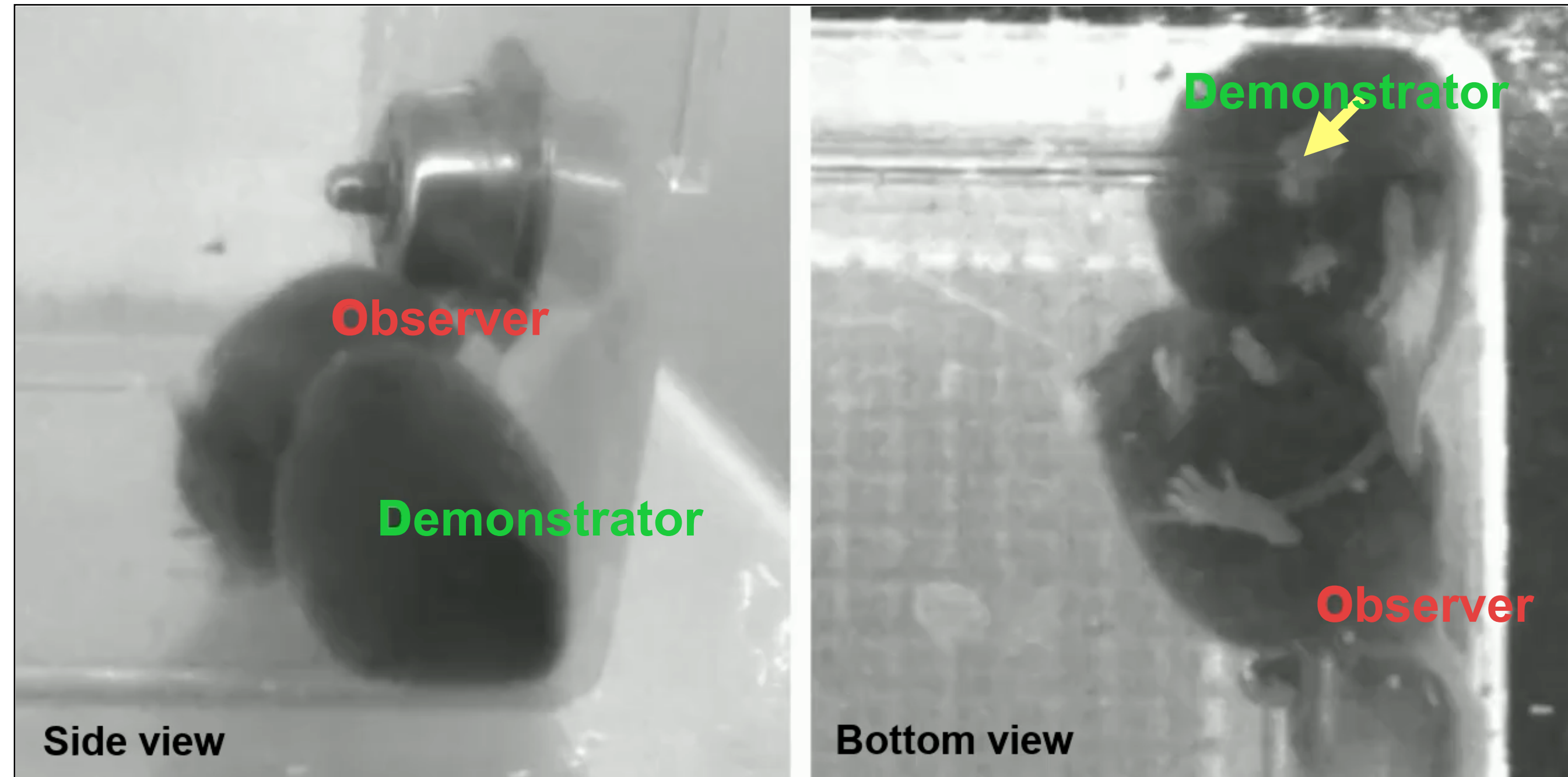
Comforting vs. targeted helping



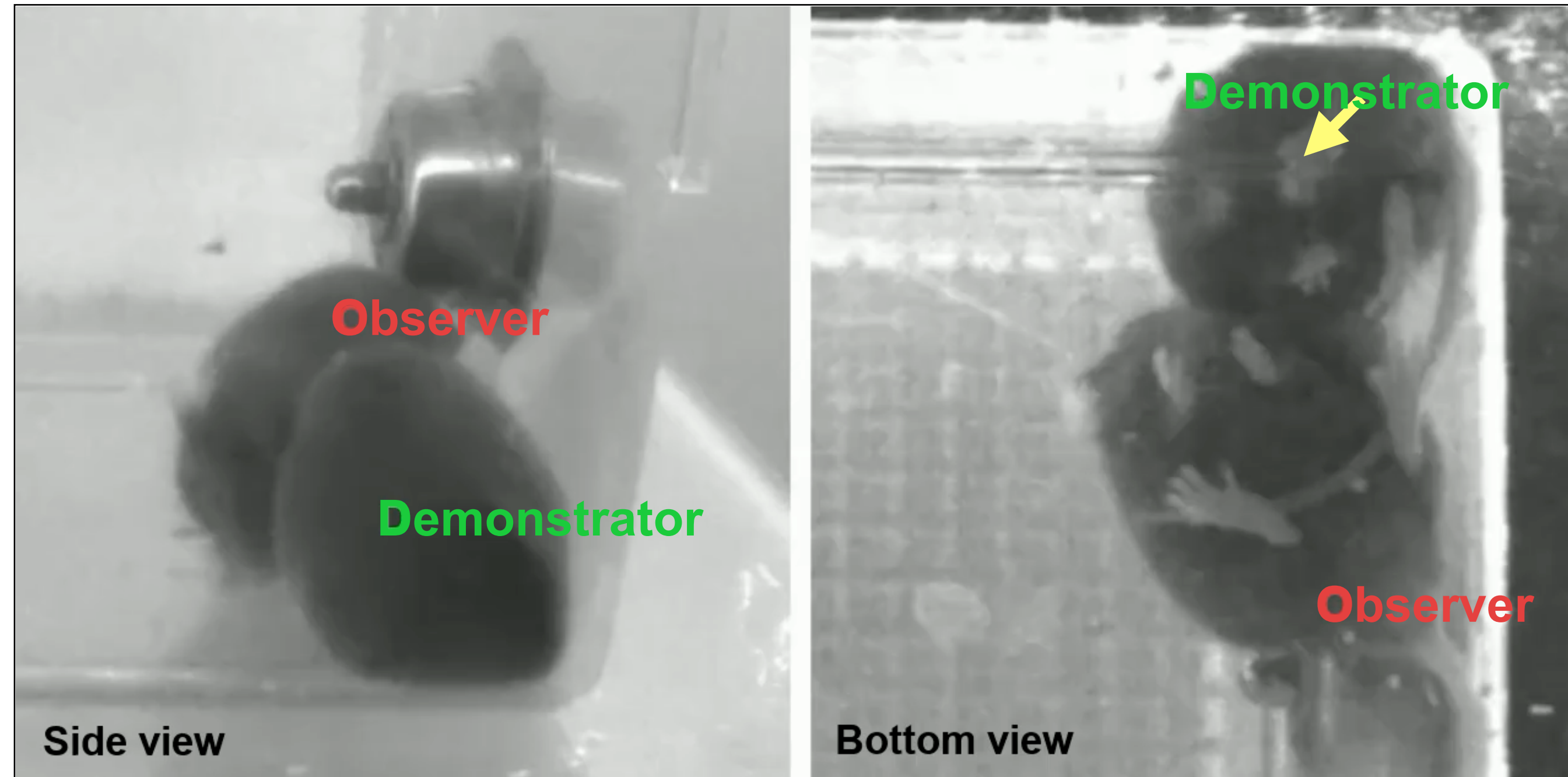
Comforting vs. targeted helping



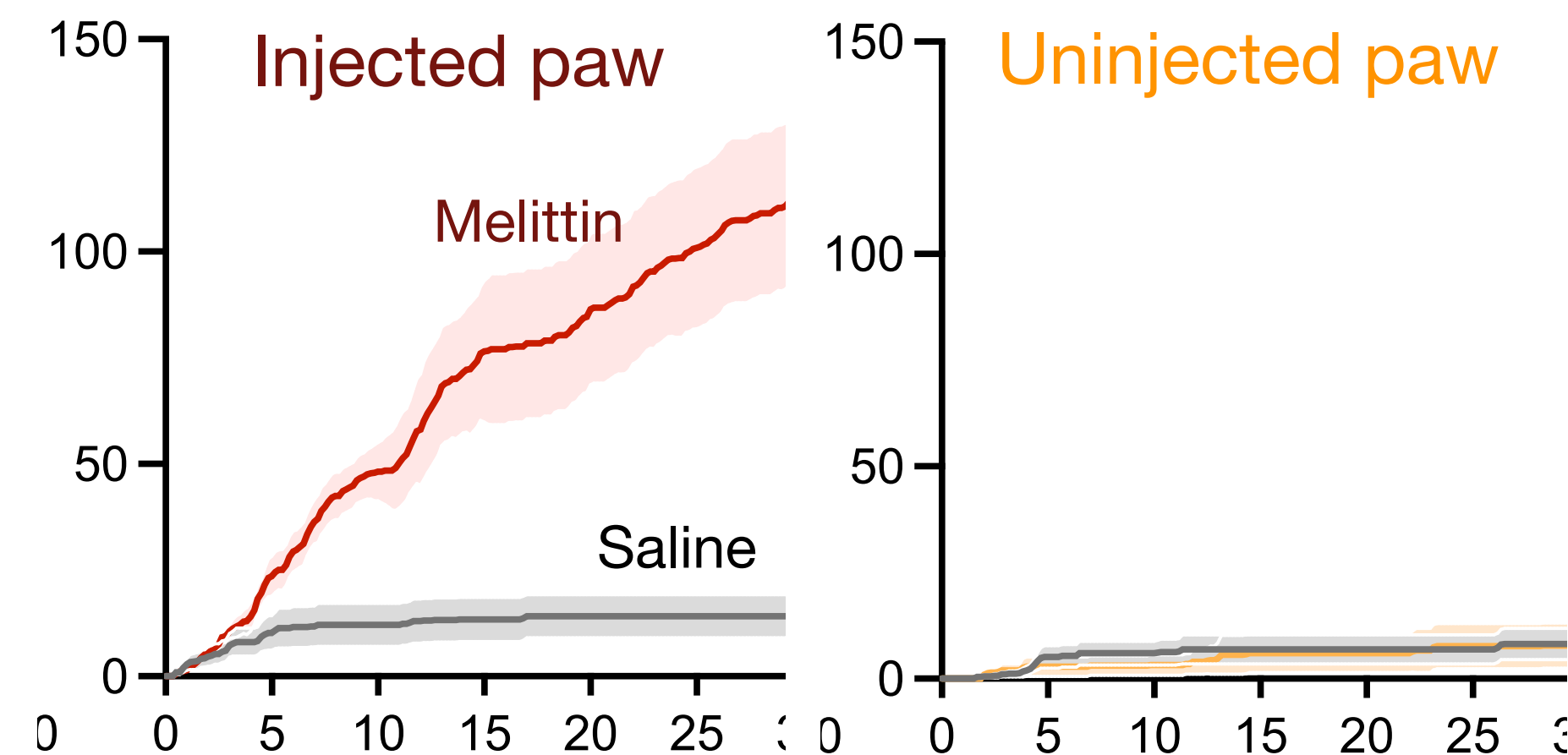
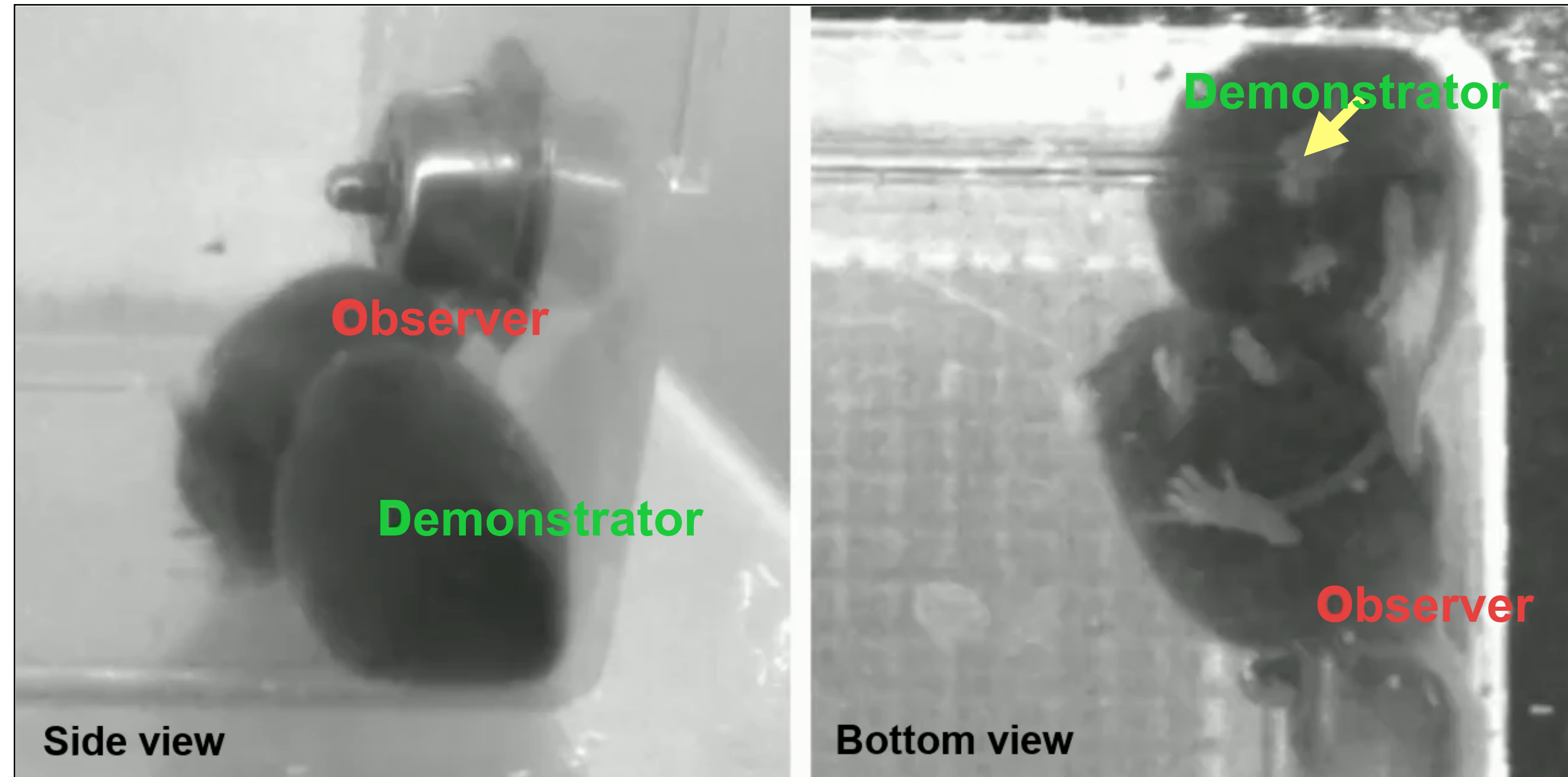
Social licking (allolicking) in response to other's localized pain/injury



Social licking (allolicking) in response to other's localized pain/injury

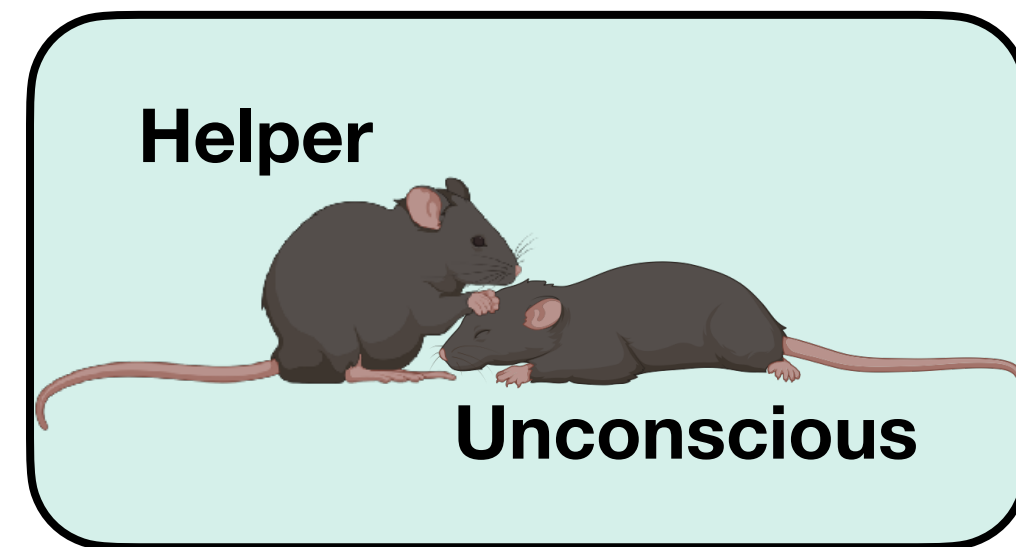


Social licking (allolicking) in response to other's localized pain/injury



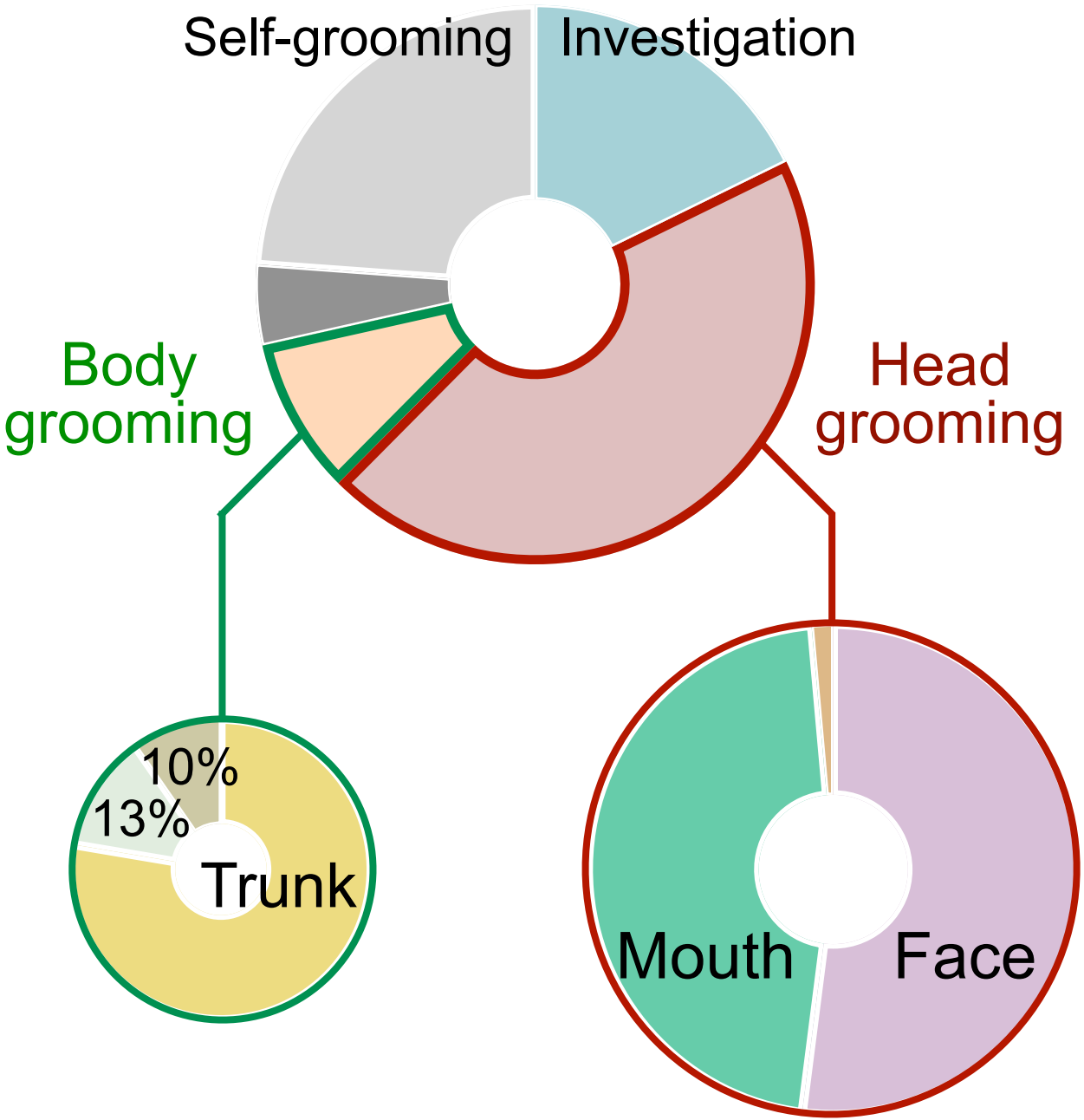
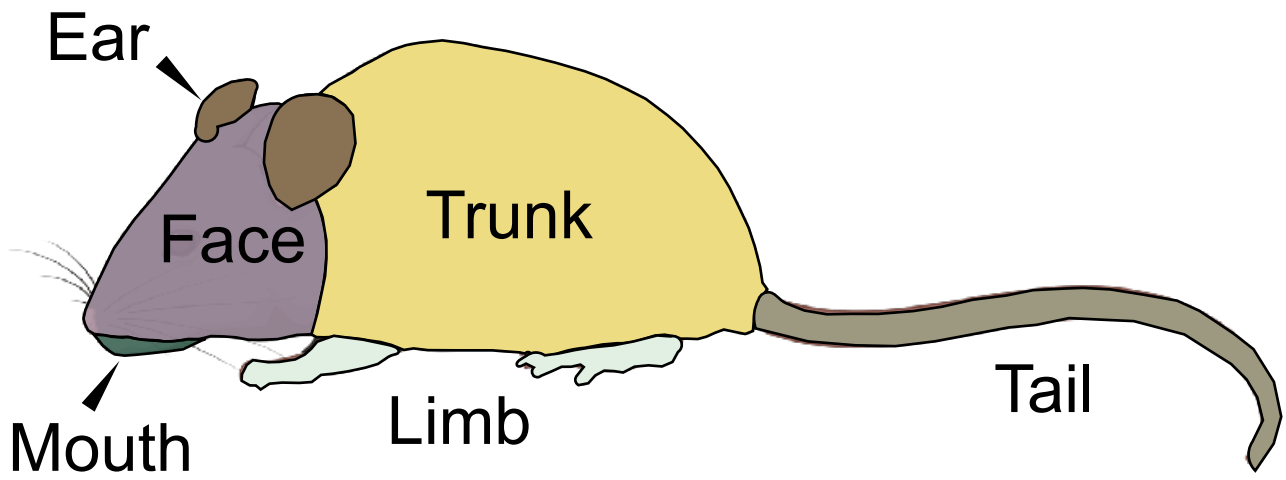
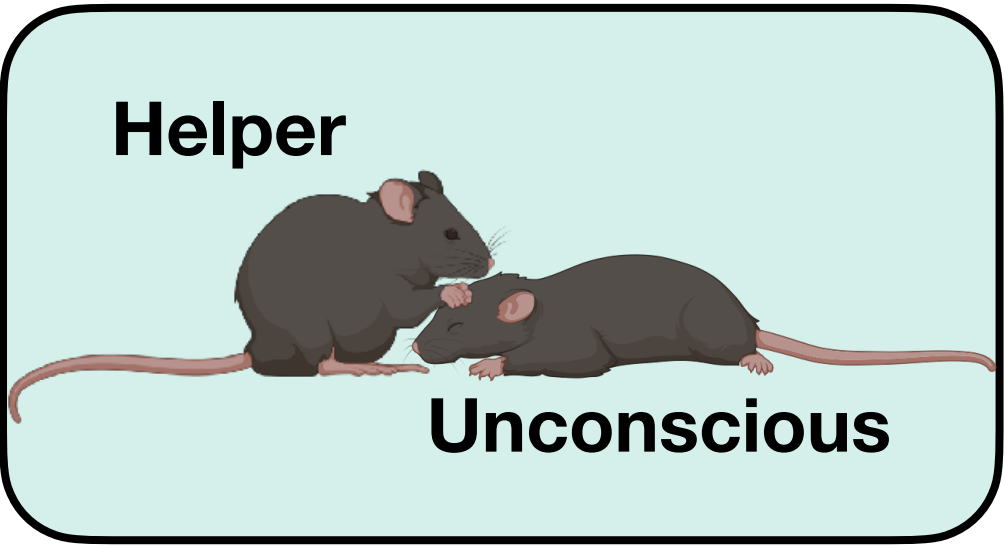
Rescue-like behavior towards unconscious animals

**Behavioral response to
unconscious conspecific**



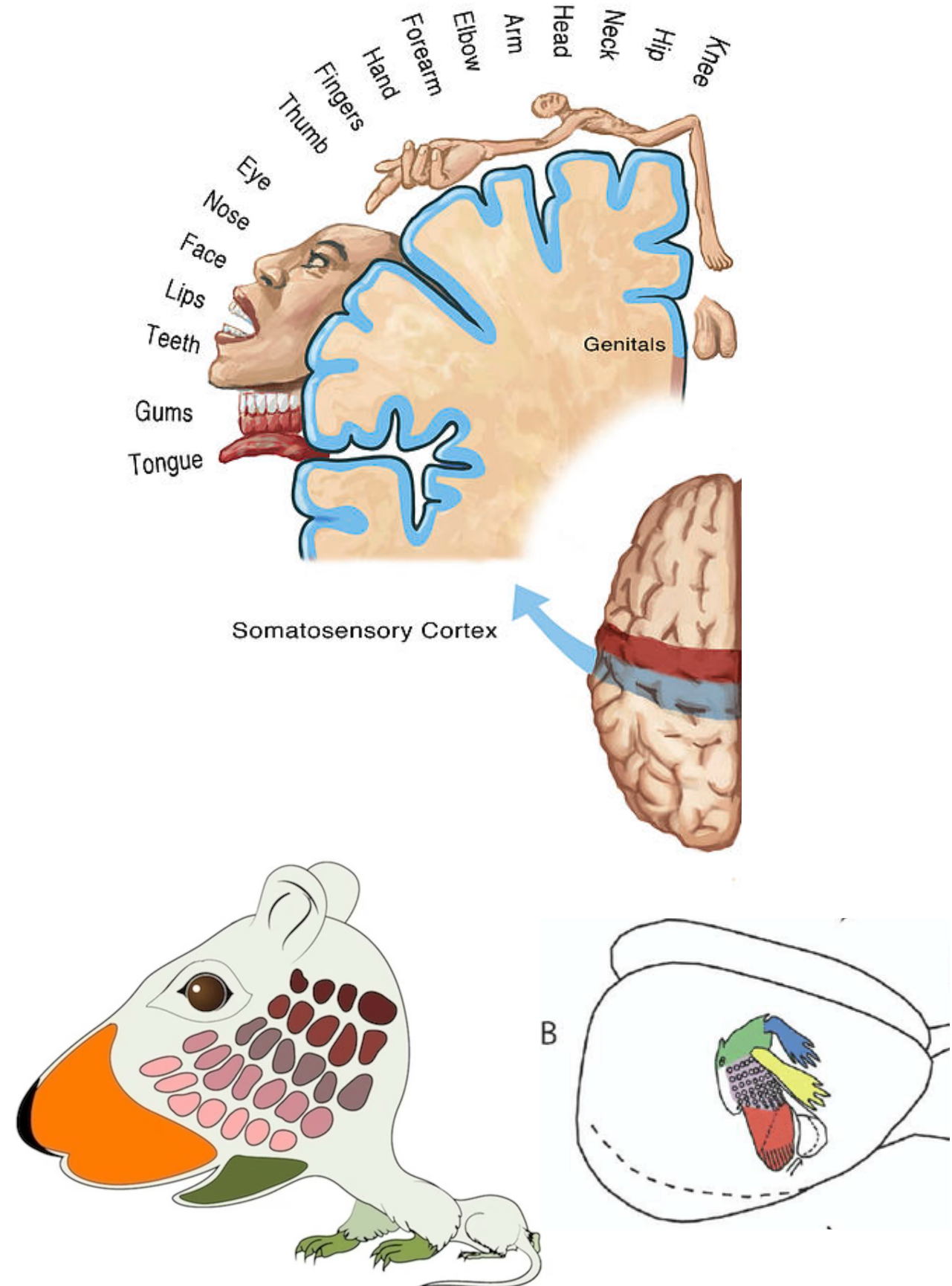
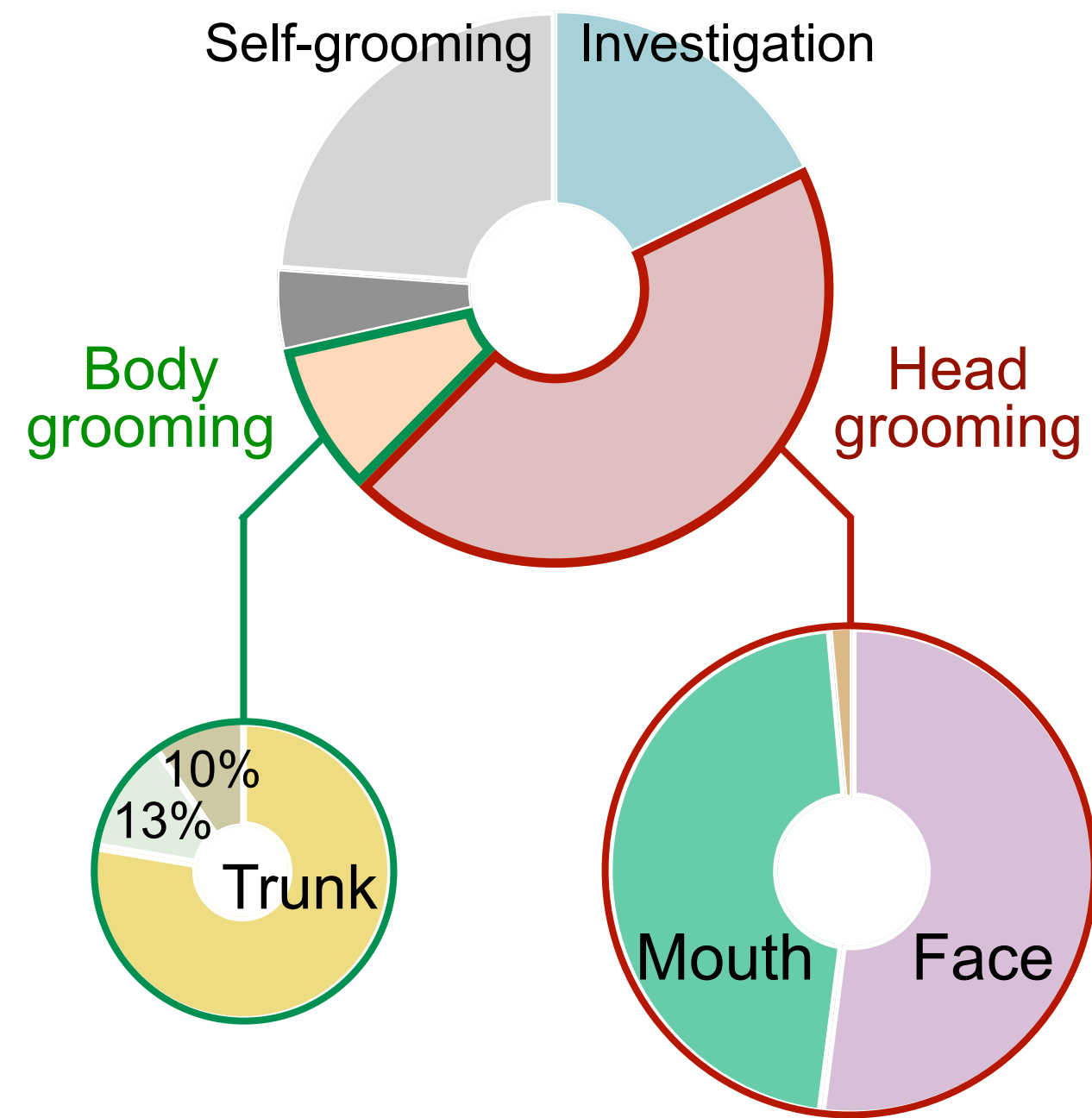
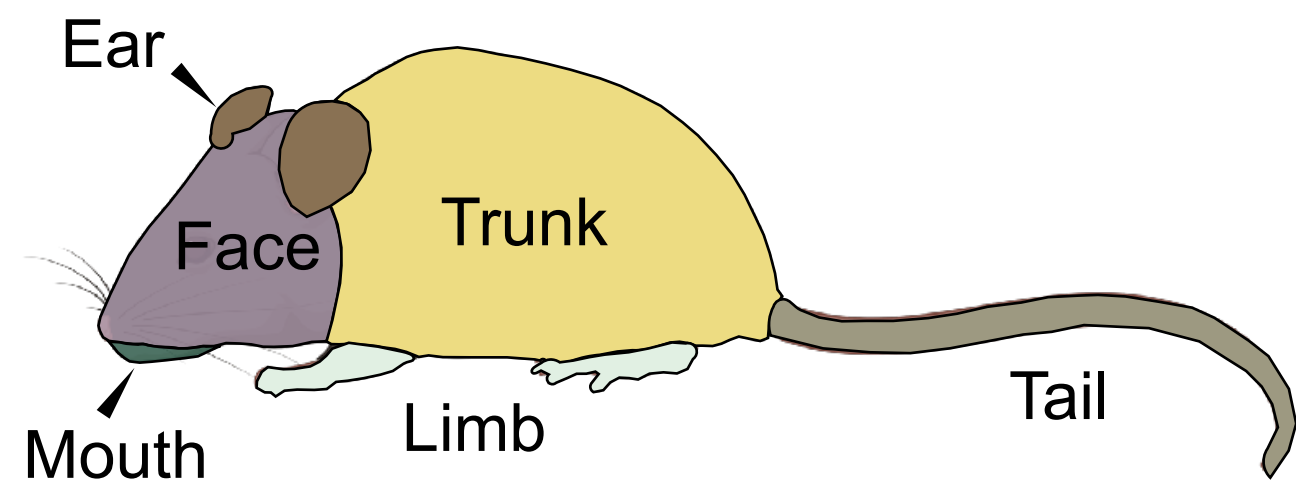
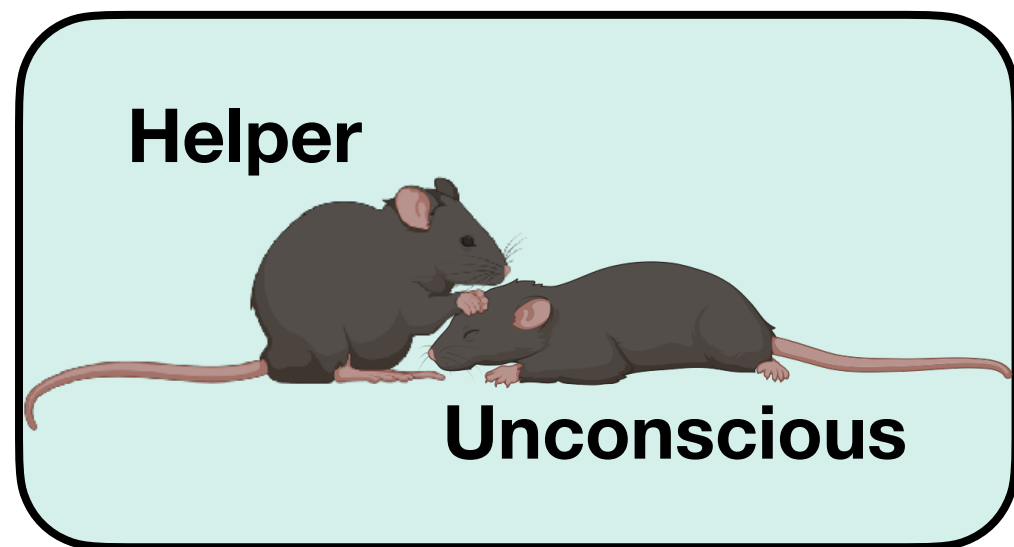
Rescue-like behavior towards unconscious animals

Behavioral response to unconscious conspecific



Rescue-like behavior towards unconscious animals

Behavioral response to unconscious conspecific



(Bjaalie *et al.* 2005)

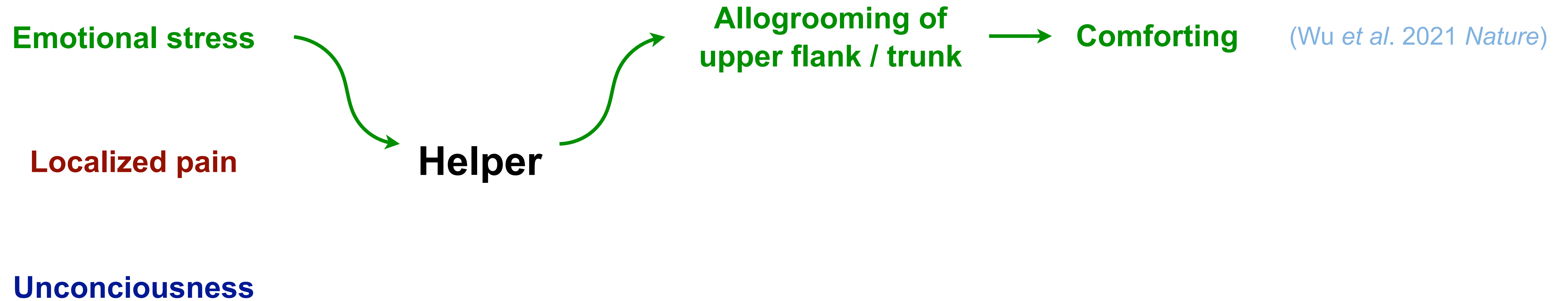
Distinct forms of prosocial behaviors

Emotional stress

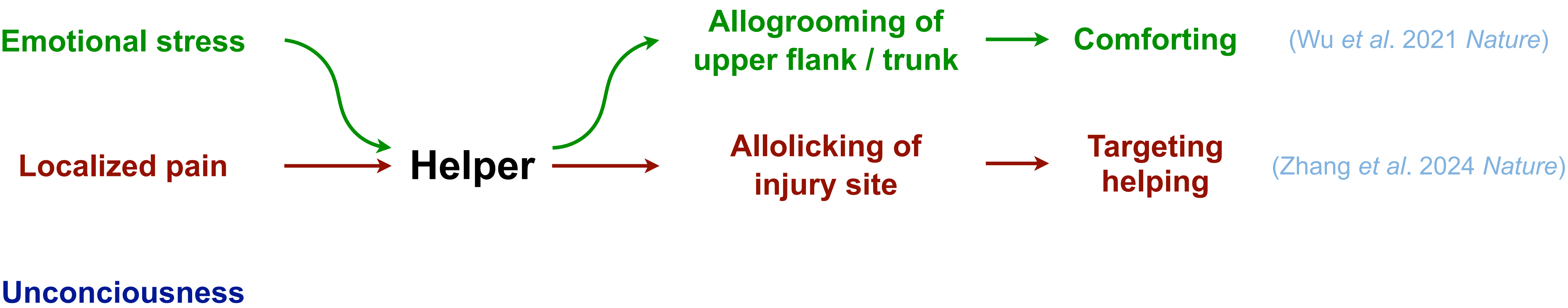
Localized pain

Unconsciousness

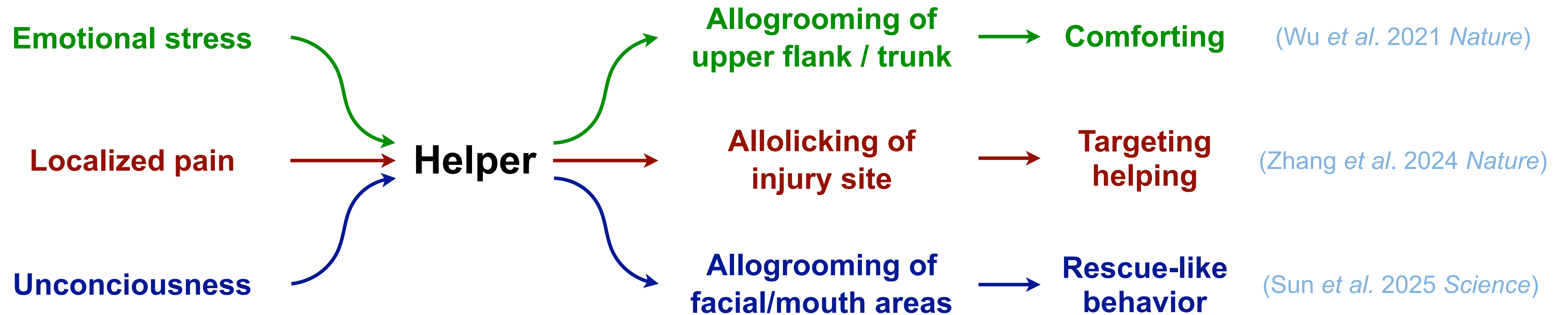
Distinct forms of prosocial behaviors



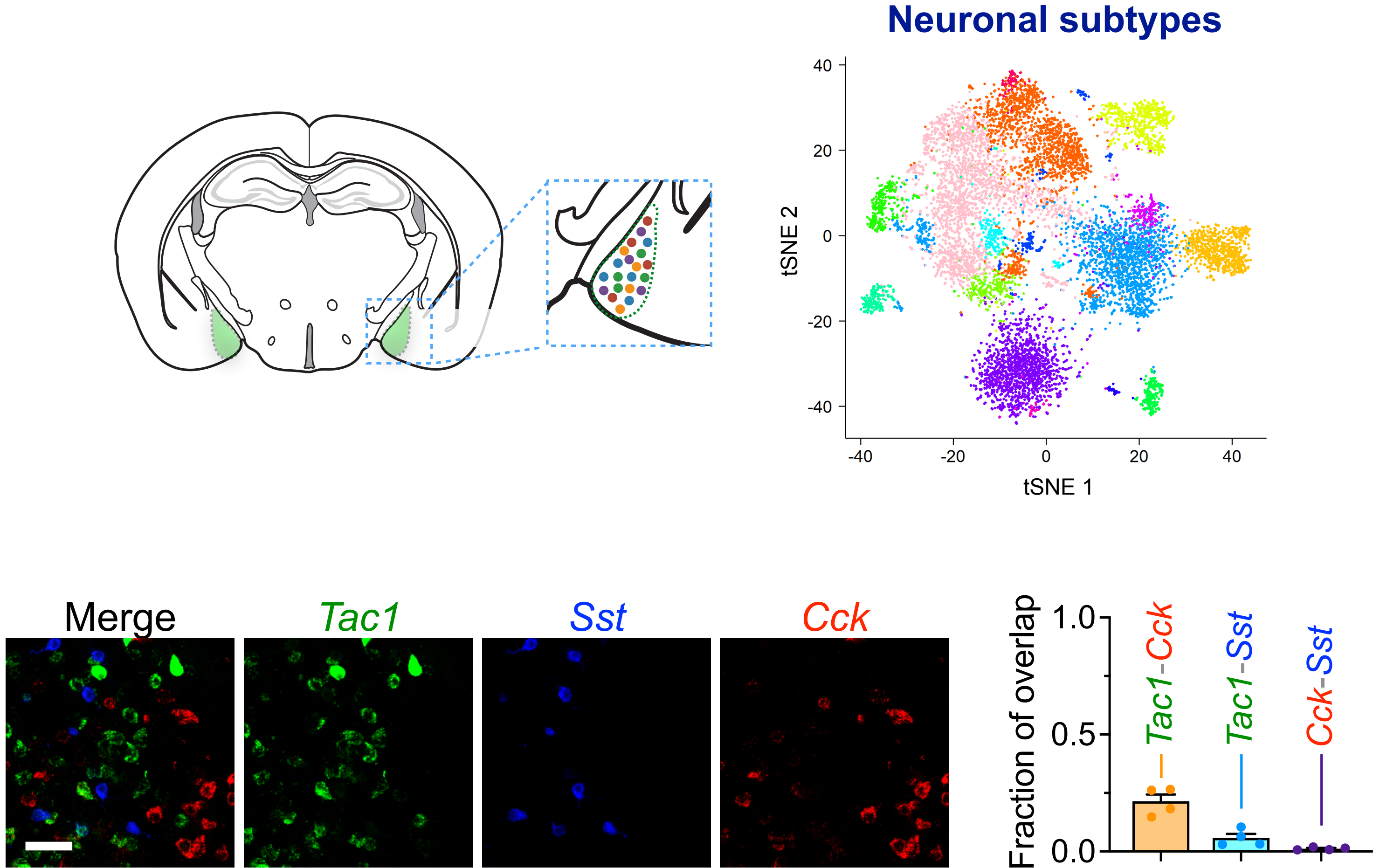
Distinct forms of prosocial behaviors



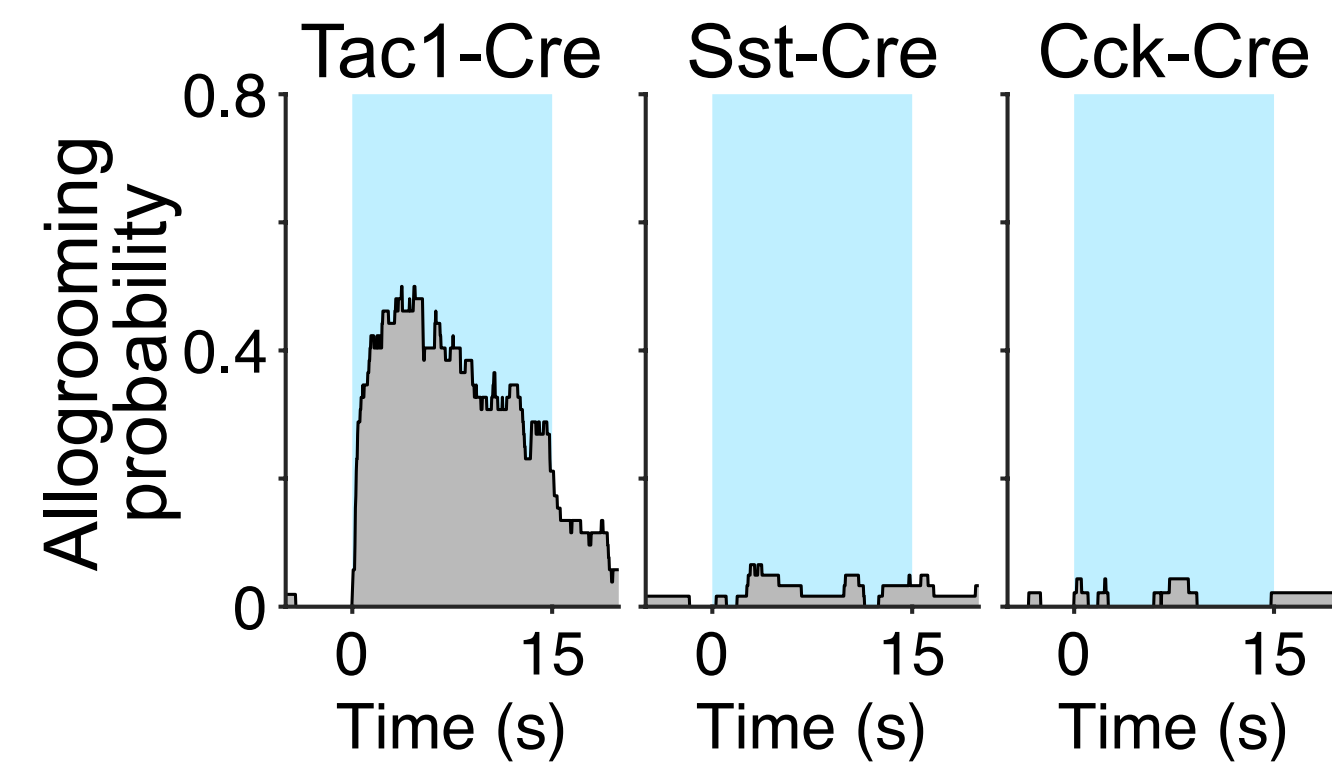
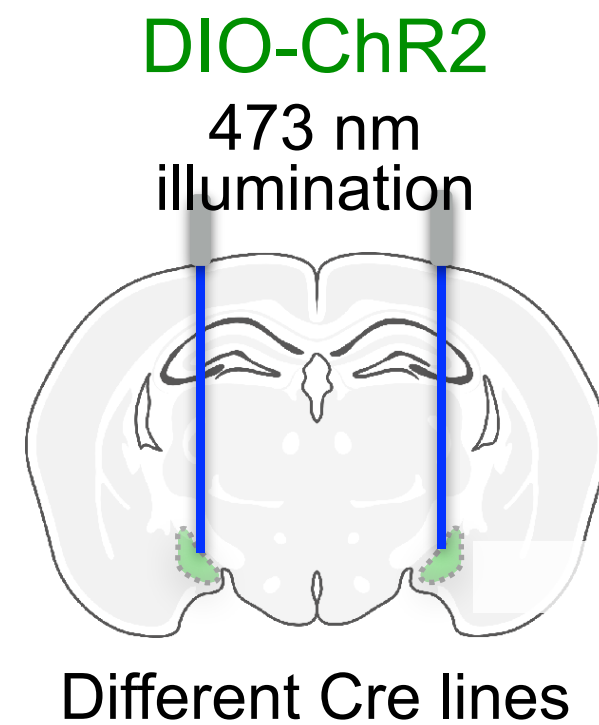
Distinct forms of prosocial behaviors



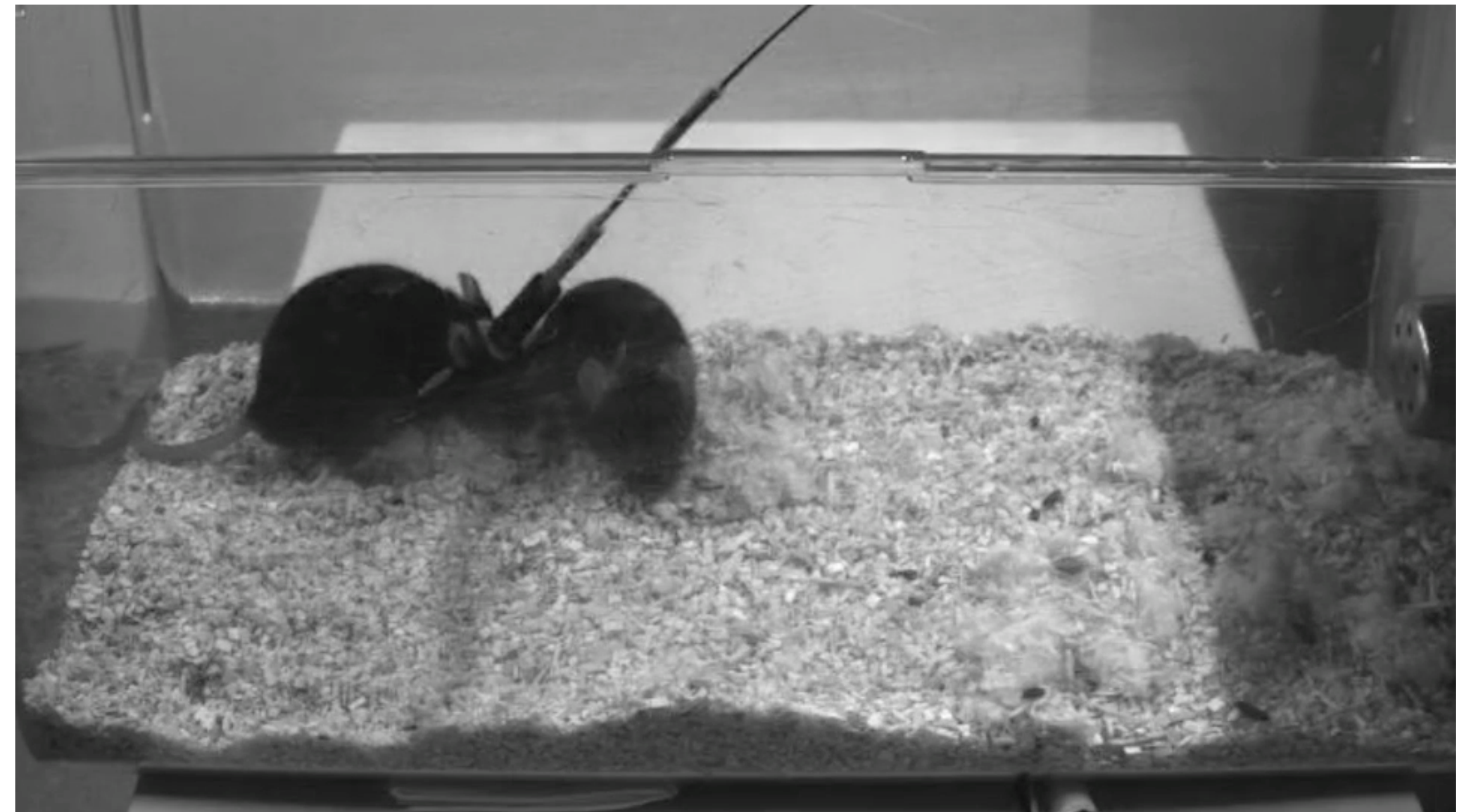
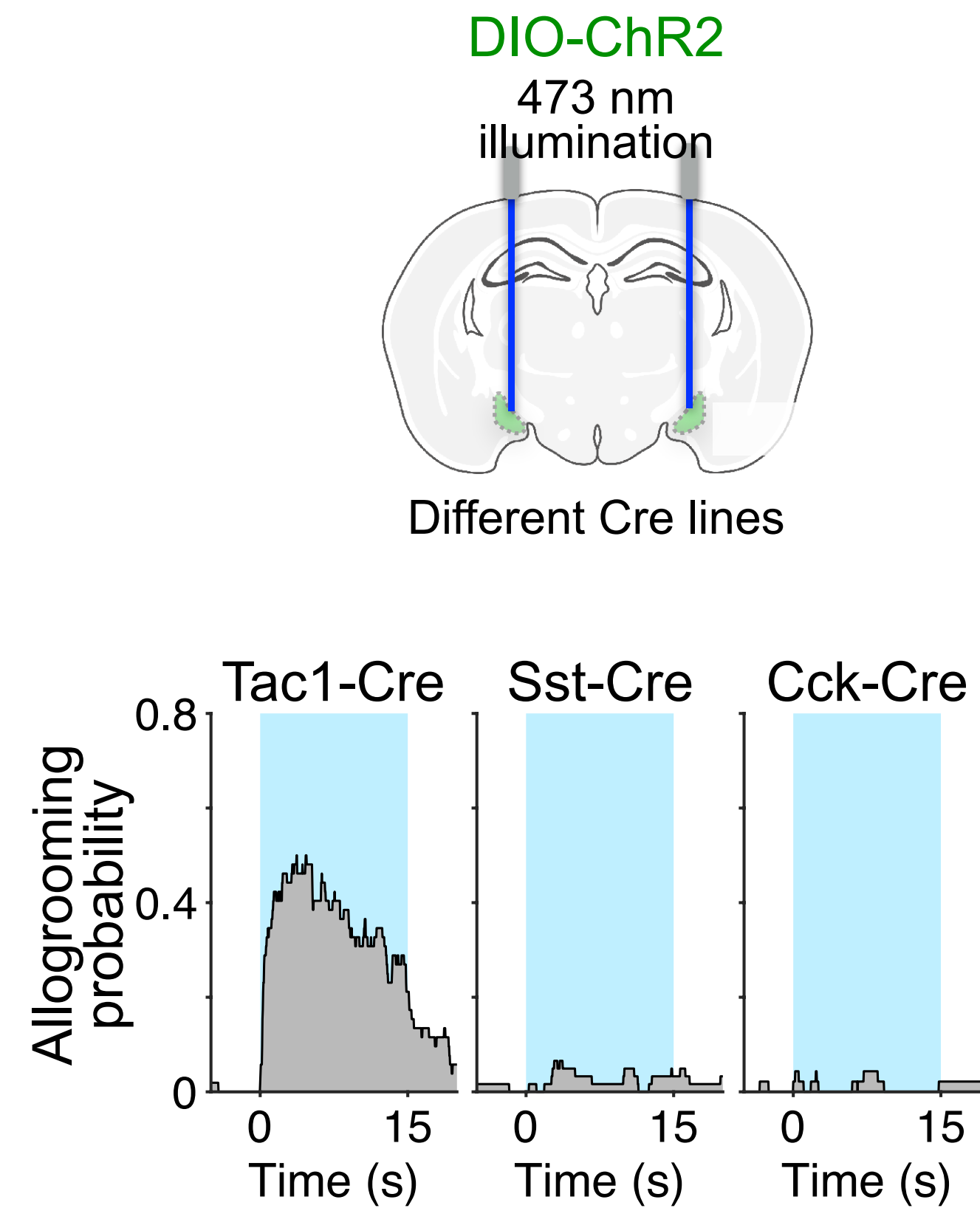
Neuronal cell types in the medial amygdala



Medial amygdala Tac1⁺ neurons promote allogrooming

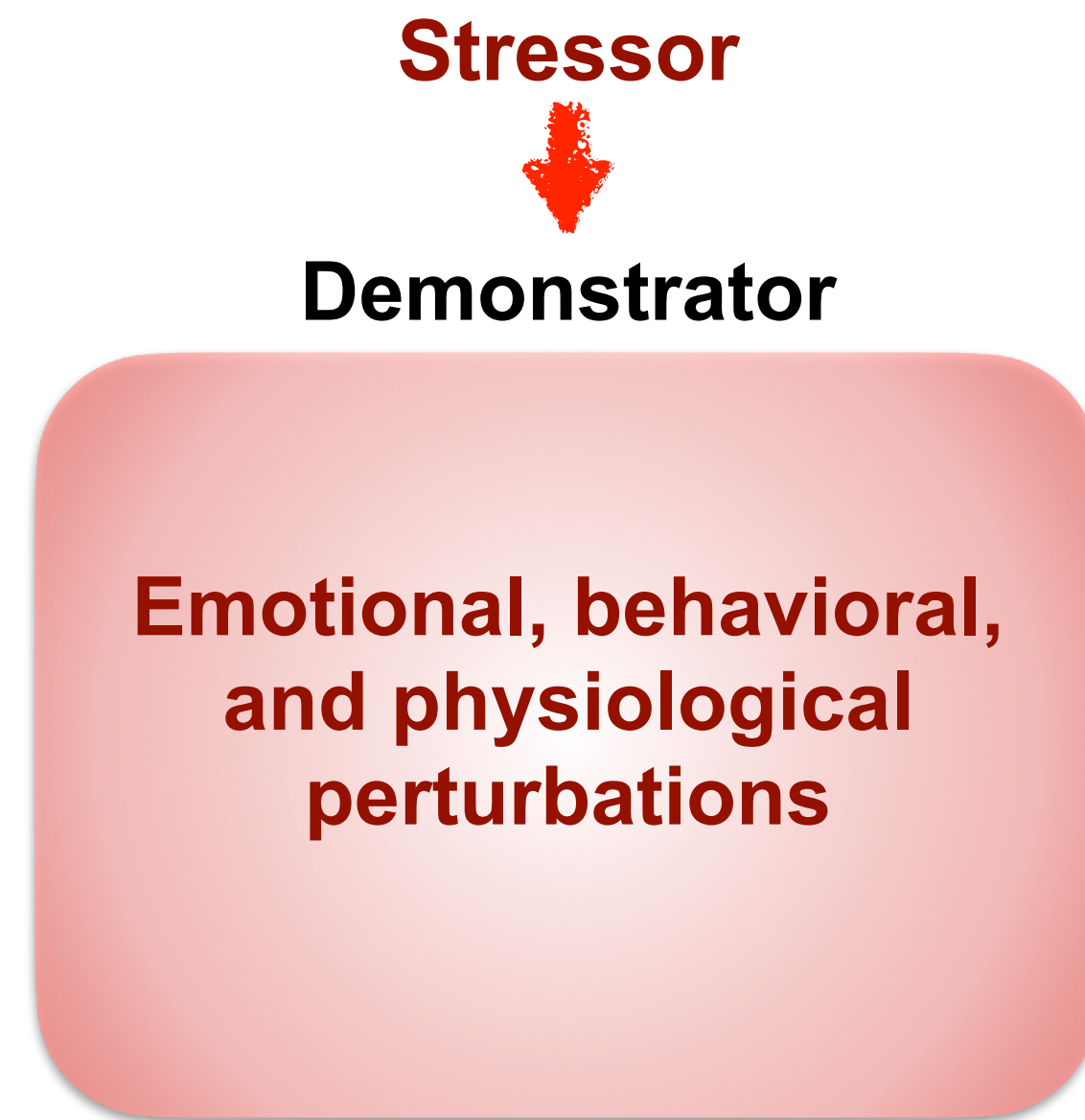


Medial amygdala Tac1⁺ neurons promote allogrooming

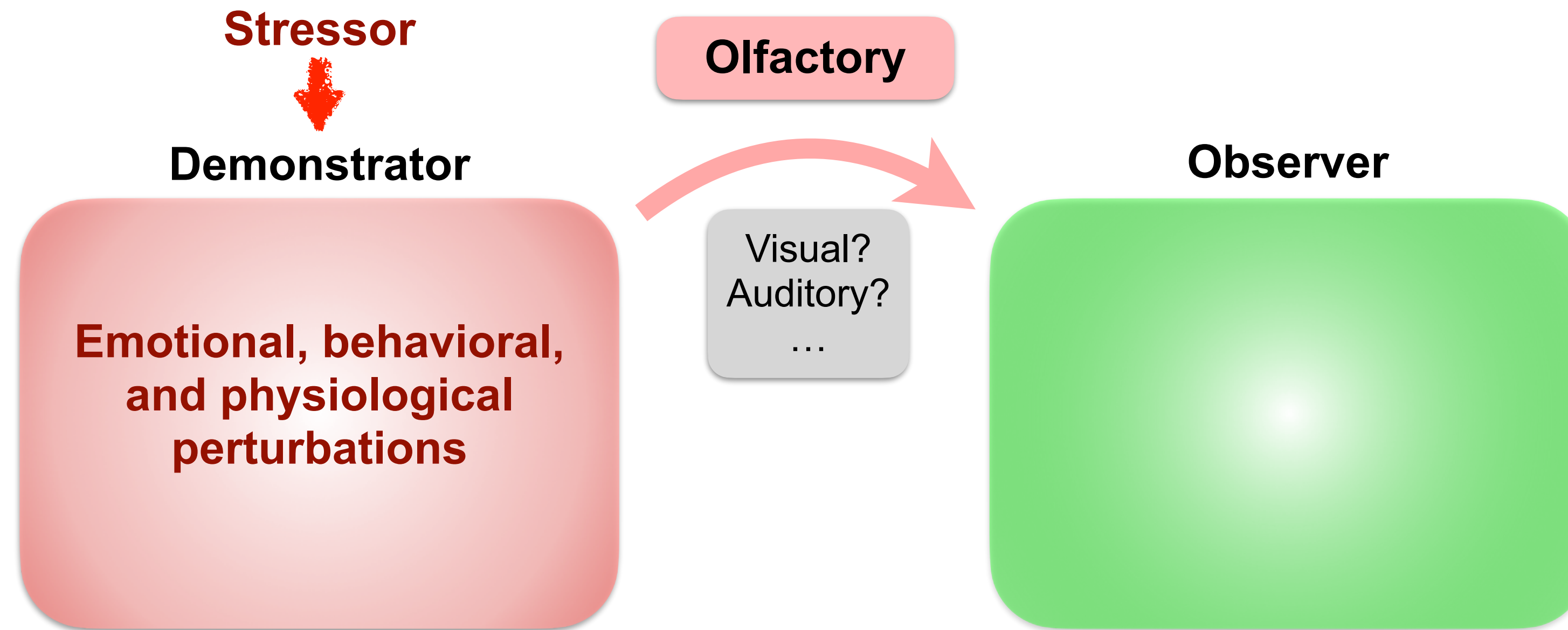


A model of prosocial comforting behavior

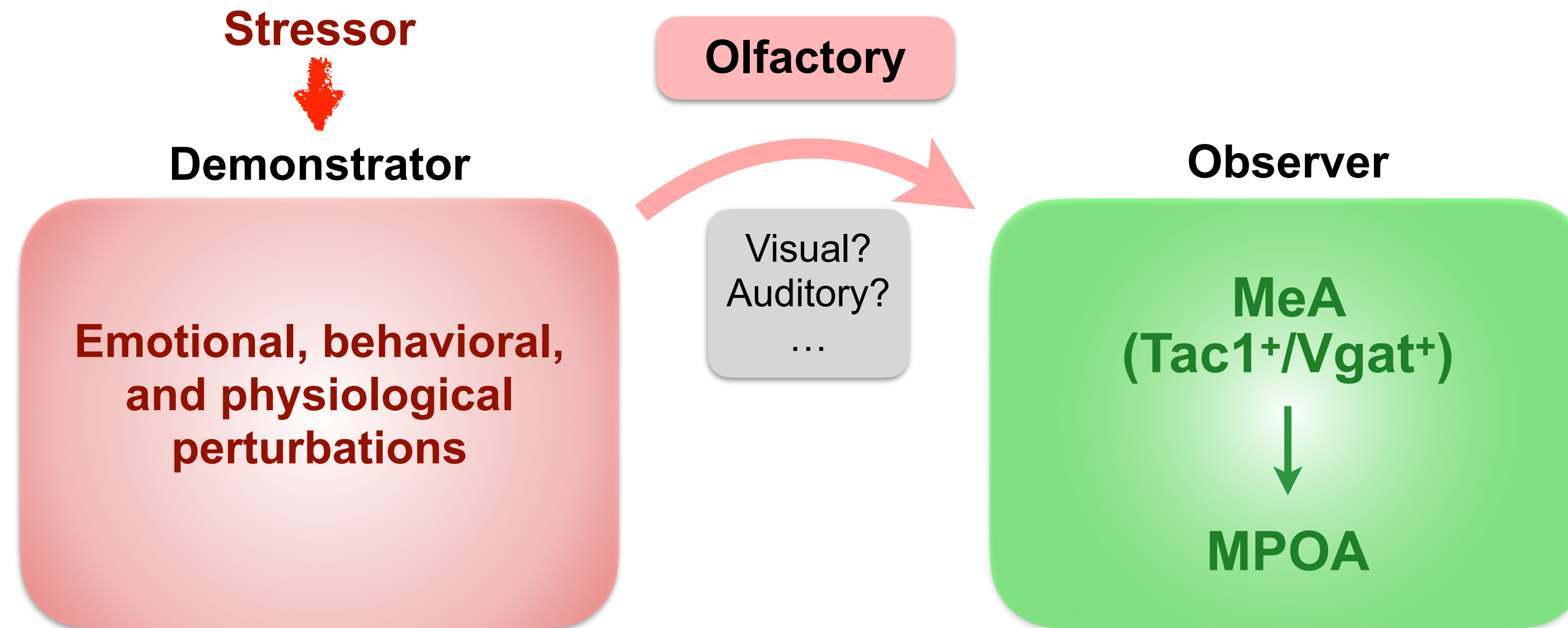
A model of prosocial comforting behavior



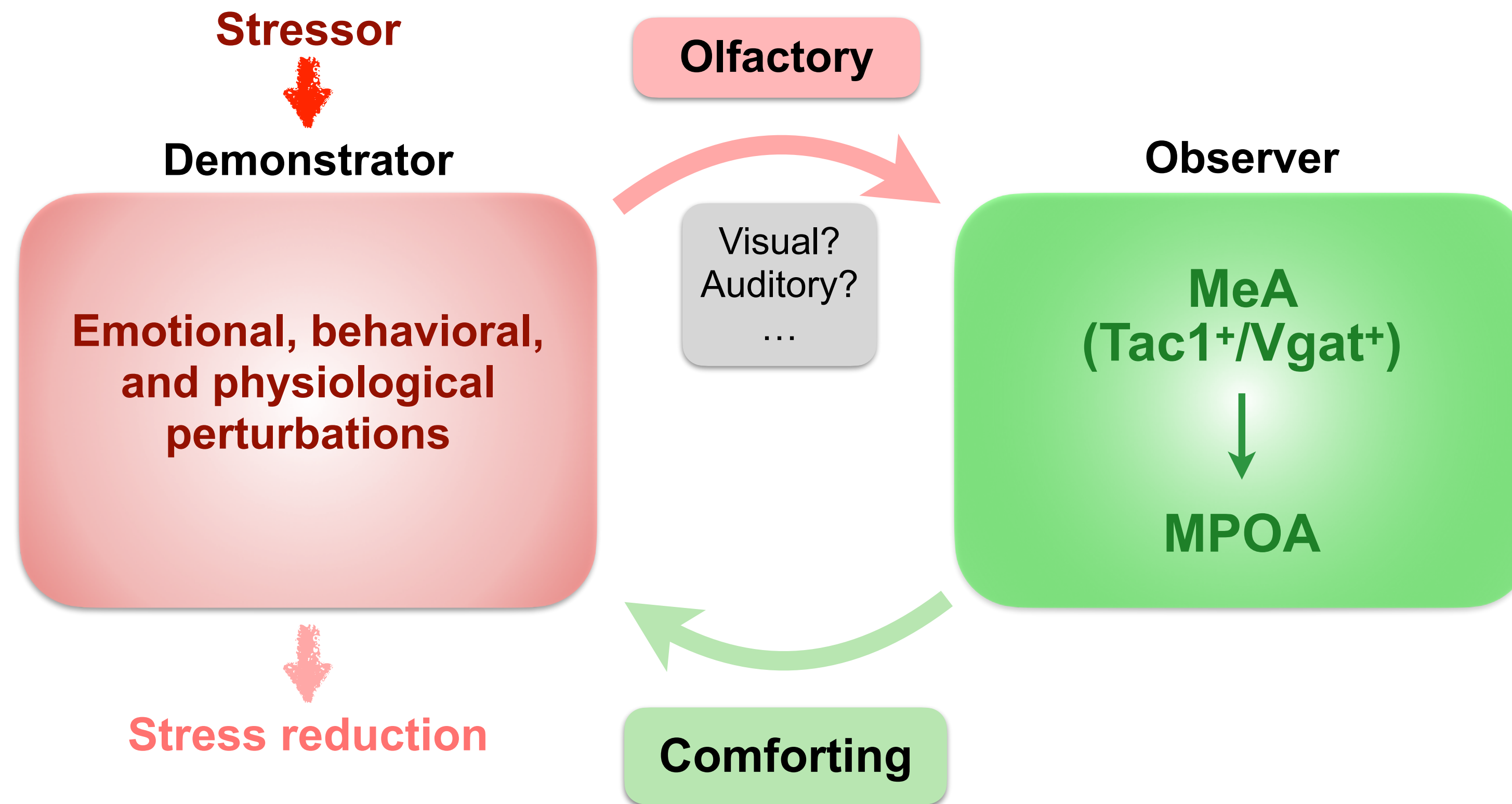
A model of prosocial comforting behavior



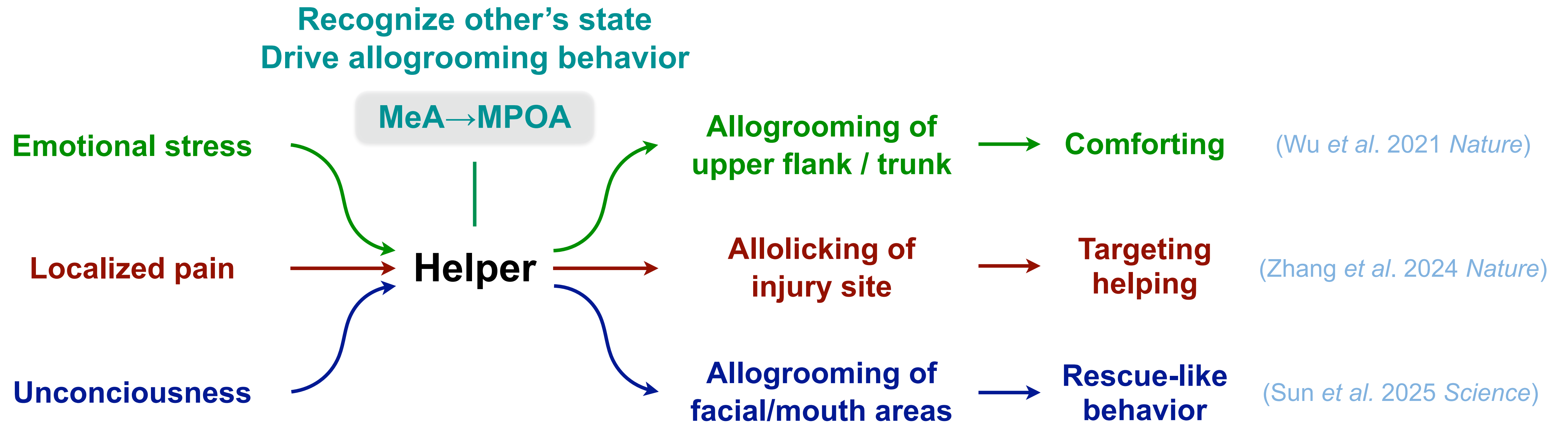
A model of prosocial comforting behavior



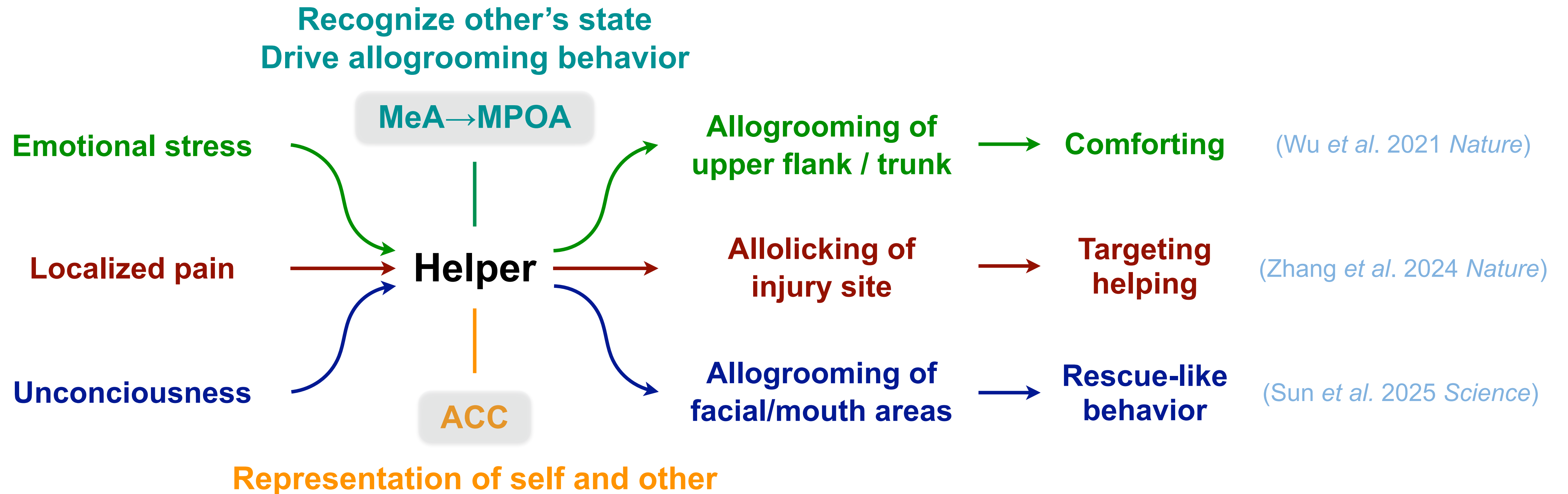
A model of prosocial comforting behavior



Summary



Summary



Acknowledgements

- Hong Lab -



- Collaborators -



Funding Sources

