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Stephen F. Cooke

stephen.cooke@umontana.edu

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# Familiarity affects interaction: social behavior differences in pairs of stranger and cagemate degus



Stephen Cooke, Janelle Shamp, Kinsey Webb, Hannah Spadafora, Kendall Butler, Bridget Stickels, Amber Thatcher, Nathan Insel

Department of Psychology, University of Montana



The brains of social animals are adapted to form new relationships, but little is known about relationship learning in most species. Here we sought to develop more precise and rigorous methods to examine how degu behaviors changed while learning about each other.

**Degus** are social rodents native to Chile. Their high social motivation and complex social behaviors, including vocalizations, makes them a valuable animal model.



**Do degus show predictable behavior changes over repeated pairings with novel degus?**

## Methods

**Subjects:** 20 adult aged degus; 4 male pairs and 6 female pairs.

**Independent Variables:**

- 1) Stranger vs. cagemate
- 2) Exposure number

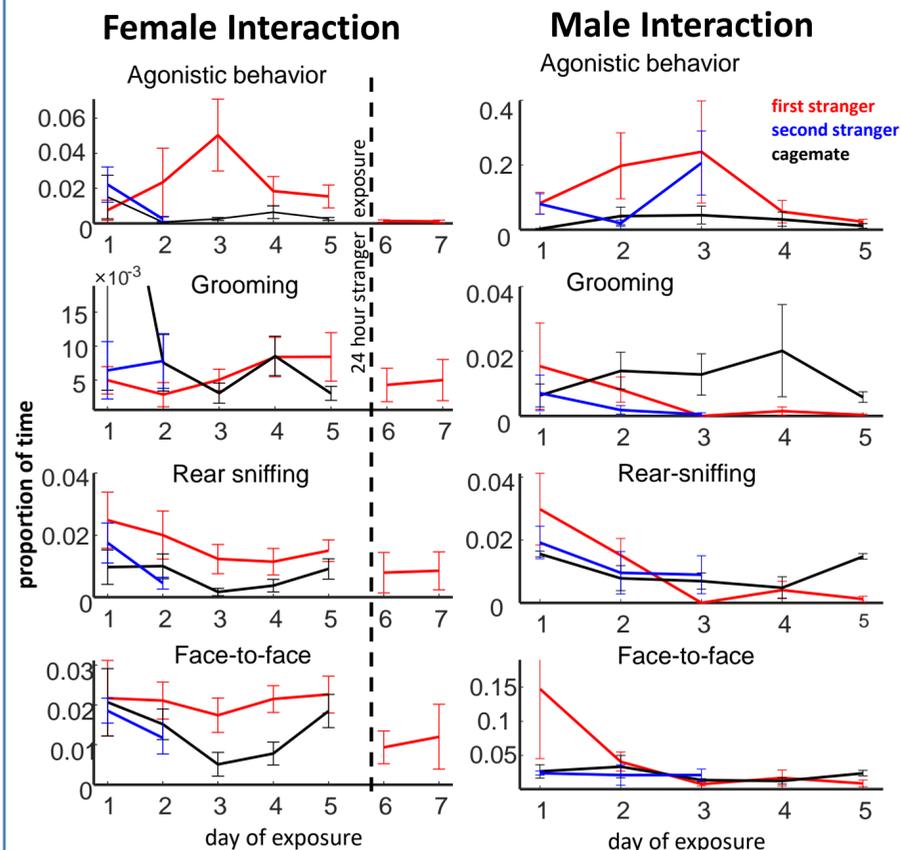


Reunion box, (pictured) used for degu pairings.

**Protocol**

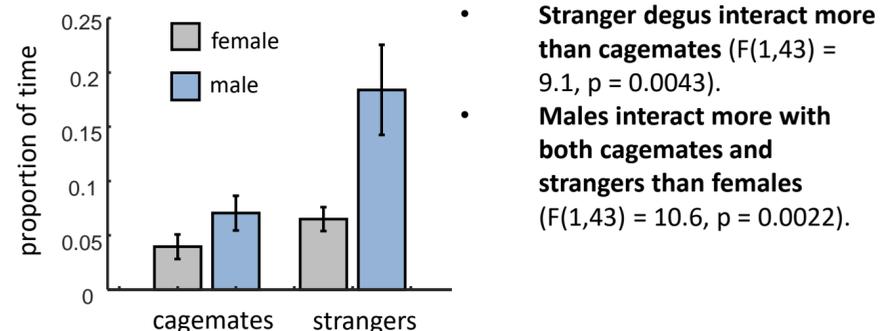
1. 5 days of pre-exposures.
2. 24 hour separation prior to pairing
3. Degus were paired (5 times with strangers and 5 times with cagemates) and filmed during **20 minute interaction sessions**.
4. 1-3 additional stranger trials after the other pairings were used to control for time and testing effects.
5. Interaction videos were **scored for agonistic, affiliative, and investigative social behaviors** (e.g. boxing, grooming, and rear sniffing).

## Results



- **Rear sniffing in males decreases across exposures** for both strangers and cagemates. (2-way ANOVA, day and social relationship; effect of day in males  $F(4,18) = 4.0, p = 0.018$ ).
- **The proportion of agonistic encounters was higher in strangers.** (2-way ANOVA, day and social relationship; effect of social relationship in males:  $F(1,18) = 4.73, p = 0.043$ ; in females:  $F(1,88) = 5.63, p = 0.02$ )
- **Females rear-sniff more with strangers than with cagemates.** (2-way ANOVA, day and social relationship; effect of social relationship in females:  $F(1,88) = 7.58, p = 0.0072$ ).

## Interaction Differences



- **Stranger degus interact more than cagemates** ( $F(1,43) = 9.1, p = 0.0043$ ).
- **Males interact more with both cagemates and strangers than females** ( $F(1,43) = 10.6, p = 0.0022$ ).

## Aggression in Males



- **In males strangers had to be separated due to serious fights more often than cagemates** ( $\chi^2 = 5.469, p = 0.019$ ).

## Discussion

- **Strangers spend more time interacting than cagemates.** *Interaction may promote relationship learning*
- **Increased interactions in strangers were selective for certain types of behaviors, particularly agonistic interactions.** *Agonistic interactions may help “negotiate” new relationships.*
- **Most stranger-cagemate differences did not change over 5 exposures.** *24 hour pairing with the stranger (in females) appeared to reduce agonistic interactions. Establishing “in group” relationships may require extended exposure periods.*
  - In males, rear-sniffing appeared to decrease over days, but this was true of both strangers and cagemates.
- **Males interacted more with both strangers and cagemates than females.** *This may be predominantly with agonistic interactions, suggesting a strong motivation to be aggressively competitive.*

## Future directions

- Vocalization changes with familiarity may complement results from physical interactions
- While degus may change some behaviors systematically, they may also form unique relationships with specific individuals. Further analyses will help establish whether this “relationship learning” takes place.
- Understanding how degus change interactions with familiarity offers a first step toward investigating plasticity of social memory systems in the brain, and their dysfunction in conditions like Autism Spectrum Disorder.