

Physical Pragmatics (model)

Model Analysis

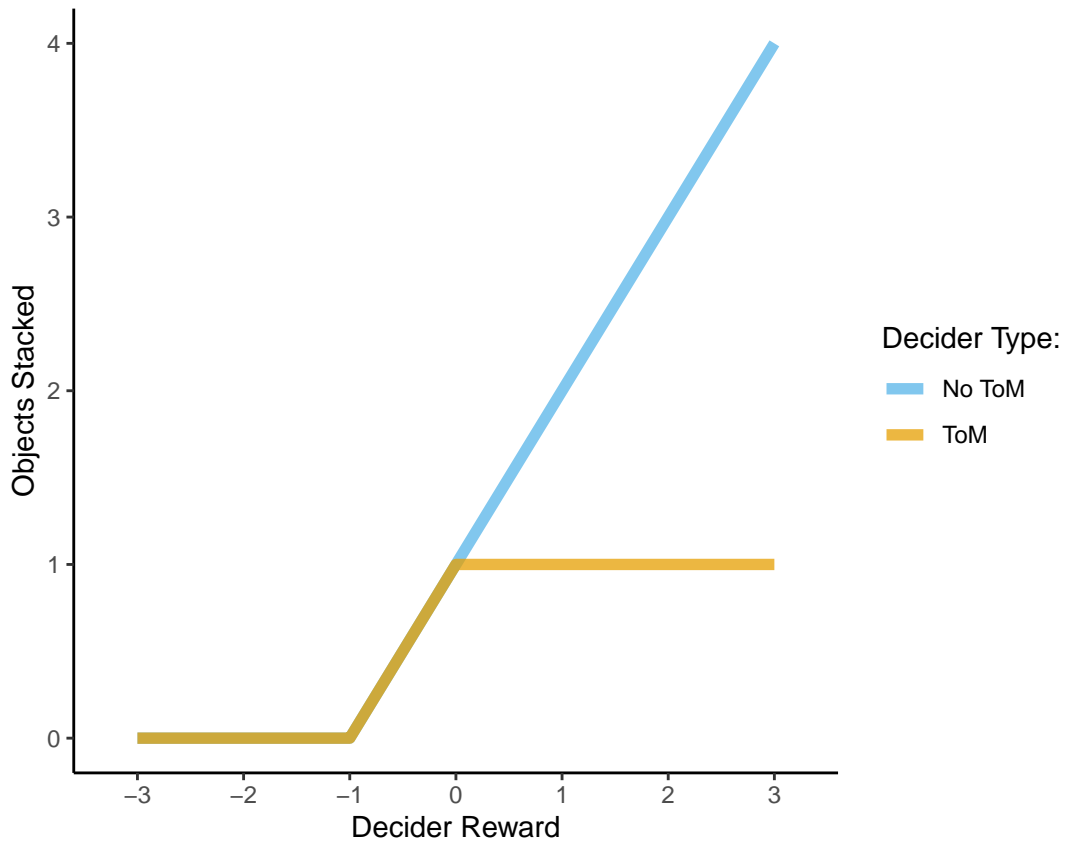
Here we compute model predictions for our two kinds of agents: enforcers and deciders.

```
# Read in the model predictions for the (standard) enforcer model.
enforcer_0 = read_csv(file.path(data_path,
                                "standard_enforcer_1.0_1.0_0.0_0.0.csv"))

# Transform the decider rewards and enforcer actions from 2-d to 1-d.
enforcer_1 = enforcer_0 %>%
  mutate(decider_reward=decider_reward_0-decider_reward_1,
         enforcer_action=enforcer_action_0-enforcer_action_1)

# Filter the relevant model predictions for the (standard) enforcer model.
enforcer_2 = enforcer_1 %>%
  filter(rationality==0.1, enforcer_reward_0==0, enforcer_reward_1==9,
         ToM %in% c(0.0, 1.0), method=="confidence", cooperation==10,
         decider_reward %in% c(-3, -2, -1, 0, 1, 2, 3)) %>%
  select(ToM, decider_reward, enforcer_action)

# Plot the model predictions for the (standard) enforcer model.
plot_0 = enforcer_2 %>%
  mutate(ToM=factor(ToM)) %>%
  ggplot(aes(x=decider_reward, y=enforcer_action, group=ToM, color=ToM)) +
  geom_line(size=2, alpha=0.75) +
  theme_classic() +
  theme(aspect.ratio=1.0) +
  scale_x_discrete(name="Decider Reward",
                  limits=c(-3, -2, -1, 0, 1, 2, 3),
                  labels=c(-3, -2, -1, 0, 1, 2, 3)) +
  ylab("Objects Stacked") +
  scale_color_manual(name="Decider Type:",
                    limits=c("0", "1"),
                    labels=c("No ToM", "ToM"),
                    values=c(color_palette[3], color_palette[2]))
plot_0
```



```
# Read in the model predictions for the (standard) decider model.
decider_0 = read_csv(file.path(data_path,
                                "standard_decider_1.0_1.0_0.0_0.0.csv"))

# Transform the enforcer actions from 2-d to 1-d.
decider_1 = decider_0 %>%
  mutate(decider_reward=decider_reward_0-decider_reward_1,
         enforcer_action=enforcer_action_0-enforcer_action_1)

# Filter the relevant model predictions for the (standard) decider model.
decider_2 = decider_1 %>%
  filter(rationality==0.1, decider_reward %in% c(1, 2, 3),
         ToM %in% c(0.0, 1.0), method=="confidence", cooperation==10,
         enforcer_action %in% c(-1, 0, 1, 2, 3, 4)) %>%
  group_by(ToM, enforcer_action) %>%
  summarize(decider_action=mean(decider_action_1))

# Plot the model predictions for the (standard) enforcer model.
plot_1 = decider_2 %>%
  mutate(ToM=factor(ToM)) %>%
  ggplot(aes(x=enforcer_action, y=decider_action, group=ToM, color=ToM)) +
  geom_line(size=2, alpha=0.75) +
  theme_classic() +
  theme(aspect.ratio=1.0) +
  xlab("Objects Stacked") +
  ylab("Swap Probability") +
```

```
scale_color_manual(name="Decider Type:",  
  limits=c("0", "1"),  
  labels=c("No ToM", "ToM"),  
  values=c(color_palette[3], color_palette[2]))  
plot_1
```

