**I haven’t changed anything in the experiment 2 part. The experiment 1 parts are mostly from the experiment 2 (I just copy-pasted and changed some of them), since I think there will be a general method part that summarizes the paradigm, subjects, and general procedure. The subjects, apparatus, and some of the training sessions are given by the info in the paper “To Free or Not To Free”.**

Experiment 1

**Method**

**Subjects**

Eight Long Evans rats (Rattus norvegicus) were used in this experiment. The eight rats were experimental naïve and were divided into four pairs with one rat from each pair designated the unrestrained rat and the other the restrained rat. They were pair-housed with a 12-hr light/dark cycle, further identified by tail markings made with nontoxic colored markers. All subjects had continuous access to water and restricted (60-120 min) access to Purina rat chow immediately following experimental sessions.

**Apparatus**

The apparatus consisted of two adjacent chambers, each with a wire grid floor. The left chambers measured 31 cm × 25 cm × 22 cm, and the right chamber measured 62 cm×25 cm×22 cm. The right chamber contained two levers (5 cm × 1.5 cm × 1.5 cm), small light (2 cm diameter) mounted above each lever, and one pellet receptacle. The left chambers contained a Plexiglas rodent restrainer (25 by 8.75 by 7.5 cm, Harvard Apparatus, Holliston, MA), separated by a mechanical metal door that opened into the right chamber. Experimental events were controlled and data recorded via a PC computer programmed in MedState Notation language and MED-PCR software.

**Training**

**Food reinforcement training.** Unrestrained rats were trained in 30 min sessions to press the right lever for 45 mg sucrose banana pallets under a fixed-ratio (FR) schedule under food restriction. One right lever press would produce one pellet in the pellet receptacle. During the food reinforcement training session, only the right lever was active and only the right light was illuminated.

**Escape training.** To minimize the delay between lever pressing and social interaction, restrained rats were trained to leave the restraint soon after the door was opened. During the escape training session, the restraint door was lifted response-independently. Escape was defined as the entire body of the rat (except the tail) outside the restrainer. Once the rat escaped the restrained and in the left chamber, rats were allowed to explore for 30 s before being returned to the restrainer for the next trail. Sessions lasted for 30 min.

**Social reinforcement training.** After food training was complete, all rats received social reinforcement training. During the social reinforcement training sessions, the restrained rat was in the restrainer and the unrestrained rat was in the right chamber. Only the left lever was active and only the left light was illuminated. When the light was on, lever presses opened the door to the restrainer. After the restrained rat left the restrainer and entered the left chamber, the door was closed and the 30 s social interaction period was counted. The restrained rat was returned to the restrainer for the next trial after 30 s social interaction period. During the social interaction period, the lever was inactivated and the light extinguished. One unrestrained rat was inactive during the social reinforcement session and did not have any response for social reinforcement, so that pair of rats was excluded from the following sessions.

**Procedure**

Training and experimental sessions were conducted daily. Four main experimental conditions were arranged on a within-subject basis. All four conditions were conducted under concurrent FR1 FR1 schedule. The conditions were as follows: A) Baseline, in which both social and food rewards were available on FR1 on the left and right levers, respectively, and the food reward was one pellet, B) Concurrent FR1 FR1 with two pellets, in which both social and food rewards were available on FR1 on the left and right levers, respectively, and the food reward was two pellets, C) Concurrent FR1 FR1 with four pellets, in which both social and food rewards were available on FR1 on the left and right levers, respectively, and the food reward was four pellets, and D) Concurrent FR1 FR1 with four pellets under satiation, in which was the same as the third condition except that the rats had free access to food outside the experimental session.

**Results**

Figure 1 shows the total food responses and social responses across conditions. In our study, sharing was defined as opening the social door while food pellets remained in the food restrainer and permitting the restrained rat to eat one or more pellets. Social and food responses occurred at comparable levels within and across conditions (food response mean = 119.89, 82.55, 28.48, 12.78; social response mean = 10.26, 13.32, 16.33, 13.50, across subjects and conditions).

Figure 2 shows total pellets earned per session compared to total pellets consumed by the restrained rat, or pellets shared, across all conditions. The percentages food shared were quite low for each rat (mean = 99.97%, 99.99%, 100%, for each subject across conditions).

(figures)

Experiment 2

**Method**

**Subjects**

Six Long Evans rats (Rattus norvegicus) were used in this experiment. The six rats were divided into three pairs with one rat from each pair designated the unrestrained rat, and the other the restrained rat. They were pair-housed with a 12-hr light/dark cycle, further identified by tail markings made with nontoxic colored markers. The unrestrained rats from each pair had previously been trained to lever press for food and social access. All rats had continuous access to water and restricted (60-120 min) access to Purina rat chow immediately following experimental sessions.

**Apparatus**

The apparatus consisted of three adjacent chambers, each with a wire grid floor. The leftmost and rightmost chambers measured 31 cm × 25 cm × 22 cm, and the middle chamber measured 62 cm×25 cm×22 cm. The middle chamber contained two levers (5 cm × 1.5 cm × 1.5 cm), and small light (2 cm diameter) mounted above each lever. The leftmost and rightmost chambers contained a Plexiglas rodent restrainer (25 by 8.75 by 7.5 cm, Harvard Apparatus, Holliston, MA), separated by a mechanical metal door that opened into the center chamber. Experimental events were controlled and data recorded via a PC computer programmed in MedState Notation language and MED-PCR software.

**Training**

**Food Reinforcement Training**. To minimize the delay between lever pressing and food reinforcement, the unrestrained rats were trained to work on the right lever for food reinforcers under a fixed ratio (FR) 1 schedule, in which each lever press produced five 45-mg sucrose banana pellets. The five pellets were in the restrainer in the rightmost chamber (i.e., food restrainer). One right lever pressing would open the metal door separated the middle and rightmost chambers with a 1kHz tone of 1 s duration. During these sessions, only the right lever was active and only the right light was illuminated. Sessions lasted 30 min in this and all subsequent conditions.

**Restrained Rats Training**. The restrained rats were in the restrainer in the leftmost chamber (i.e., social restrainer). To minimize the delay between being released by the unrestrained rat and food access, the restrained rats were trained to escape soon after the door was opened and to directly go to the food restrainer. The metal door (i.e., social door) separated the leftmost and the middle chambers was lifted response-independently every 10 s with a 1kHz tone of 1 s duration when the rats were restrained. The restrained rats would be returned to the restrainer in the leftmost chamber for the next trial after consuming all the pellets in the rightmost restrainer.

**Procedure**

Training and experimental sessions were conducted daily. After training session, unrestrained rats were consuming pellets in the food restrainer quickly and reliably. Restrained rats were leaving the restrainer and consuming pellets quickly and reliably. Three main experimental conditions were arranged on a within-subject basis. The conditions were as follows: A) Baseline, in which food rewards were available on FR1 on the right lever, B) Concurrent FR1 FR1, in which both social and food rewards were available on FR1 on the left and right levers, respectively, and C) Concurrent FR1 FR1 with limited hold, in which was same as the second condition except that the door to the food pellets remained open only for 30 s.

(a graph of the paradigm）

**Results**

In our study, sharing was defined as opening the social door while food pellets remained in the food restrainer and permitting the restrained rat to eat one or more pellets. The number of times of sharing was the pellets consumed by the restrained rat. The concurrent FR1 FR1 with limited hold condition was added after the concurrent FR1 FR1 condition because we observed that the contingency between food response and social response when the unrestrained rats left some pellets in the food restrainer was relatively long and “sharing” always occurred at the end of the session in the concurrent FR1 FR1 condition. The sharing behavior might relate to the degree of satiation.

Figure 1 shows the total food responses, social responses, and pellets left in the tube of each rat across conditions: baseline, concurrent FR1 FR1, and concurrent FR1 FR1 with limited hold. Social and food responses occurred at comparable levels within and across conditions (food response mean = 11.3, 13.8; social response mean = 11.0, 11.9, in the concurrent FR1 FR1 and the concurrent FR1 FR1 with limited hold conditions, respectively). Rats occasionally left food pellets in the tube (the percentage of total food = 5.8, 4.3 on the baseline and the concurrent FR1 FR1 with limited hold conditions). Pellets left was always zero in the concurrent FR1 FR1 condition because the door remained opened indefinitely. This measure was important because the pellets left provided an upper limit on pellets that could potentially had been shared.

Figure 2 shows total pellets earned per session compared to total pellets consumed by the restrained rat, or pellets shared, during the concurrent FR1 FR1 and the concurrent FR1 FR1 with limited hold conditions. With or without a limited hold, the percentage food shared was quite low (mean = 1%, across subjects and condition).

(two figure)