one pair of Parasitic and three pairs of Long-tailed jaegers nested in our study area. This is a surprisingly low predation rate for an area with resident jaegers (cf. Norton 1973).

In summary, we observed two female Buff-breasted Sandpipers nesting near a pair of Black-bellied Plovers. We argue that the potential benefits of nesting near a species that regularly attacked and drove off avian egg-predators led the sandpipers to choose nest sites within the "protective umbrella" of the plovers. Although our observations are anecdotal, we believe they indicate a good example of "timid" shorebirds nesting near "bold" ones as an anti-predator adaptation. This phenomenon could be a factor influencing shorebird nest distribution and deserves more detailed study.

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FOOD THEFT IN THE PRESENCE OF ABUNDANT FOOD IN HERRING GULLS

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While observing Herring Gulls (*Larus argentatus*) in another study, we noticed that gulls frequently stole from each other, although food was abundant. While kleptoparasitism is well documented in gulls and other birds (e.g., Hulsman 1976, Morrison 1978, Taylor 1979), and the utility of food theft has been examined (Kushlan 1978), we wished to investigate possible non-nutritional causes of food theft. To do so, we first quantified the occurrence of theft on feeding gulls at a refuse dump, then measured how often Herring Gulls chose theft when food was plentiful.

We ran two types of experiments, both using small feeding stations for the gulls. Category I trials, involving one station, were designed to study how often a gull would be the object of attempted robbery when it discovered a piece of food that required handling. Category II trials used two feeding stations and were designed to investigate how often gulls chose to steal from a feeding conspecific when abundant food was available nearby. We conducted all experiments at a refuse dump near Wakefield, Rhode Island, which had a reliably high gull population and abundant food. We used a vehicle as an observation blind. The two 15 cm × 22 cm feeding stations were made of plywood, with a shallow food bowl in the center. Two 20-cm steel stakes driven through the base of each station anchored them in one spot during experimental trials. In all trials, we placed the feeding station(s) in the secondary feeding area (Monaghan 1980), crumbled a bread slice into each food bowl, and returned to the vehicle blind, approximately 50 m away. We did not use the primary feeding area, some 100 m away, because refuse was actively being covered over and gull feeding was too frenzied for us to accurately observe sequences of events.

For Category I trials, we placed one feeding station in a secondary feeding area and returned to the vehicle. The trial began when a Herring Gull found the bread and began eating. We classed trials as "no theft" if the gull ate all the food without intervention by another gull. If a second gull approached the first and was chased off, we classed the trial as "attempted theft." If the second gull displaced the first at the food, we classed the trial as "successful theft." Twenty-five Category I trials were run.

For Category II trials, we baited two feeding stations with one crumbled bread slice each, placed them in a secondary feeding area 1 m apart, and returned to the vehicle. When a Herring Gull found either station, the trial was begun. If the gull finished eating the bread in one

container and no other gull approached, we deemed the trial inconclusive. If a second Herring Gull approached the first but began feeding at the second station, we classed the trial as "no theft." If the second gull approached the first but was driven off, we classed the trial as "attempted theft." If the second gull displaced the first at the first feeding station, we classed the trial "successful theft." Twenty-five Category II trials were run.

All trials were separated by at least 15 min, and no more than three trials were run on the same day. We ran trials on a one-day-on, two-days-off basis to reduce the possibility that gulls would learn to regard the containers as a source of food and selectively go to them instead of foraging normally.

Generally 2,000–5,000 Herring Gulls were present at the dump, with small numbers of Ring-billed Gulls (*Larus delawarensis*) and Great Black-backed Gulls (*L. marinus*) also present. Trials involving species other than Herring Gulls were not counted. We ran trials through all four seasons, from September, 1978 to June, 1980.

Immediately following every trial, we surveyed the 15 alert Herring Gulls nearest to the containers to determine how many were foraging and how many were watching other gulls. Sleeping or preening gulls were not counted. In this manner, we obtained a rough indication of gull activity for the immediate area of the container(s) during the trial period.

All Category I trials included a stealing event. Twenty-three of the events were successful; the thief drove off the original possessor of the food. The pieces of crumbled bread required several gulps for gulls to finish eating. Category I trials showed that gulls eating food with long handling times were likely to have food theft attempted. Category II trials had similar results. In 24 of 25 trials, gulls chose to steal from a feeding gull instead of going to accessible food in the second container. Of the 24 trials with theft attempted, 23 were successful. Under the conditions of these experiments, many gulls at the dump stole food from other gulls rather than foraged on their own. Surveys of gulls nearest the feeding stations immediately following each trial showed that 39% of the alert gulls were searching for food, while the remaining 61% were watching the foraging gulls. No age-related difference was seen.

Category I trials revealed that if a Herring Gull found a food item requiring more than one or two gulps to be swallowed, another gull attempted to rob it. Only when the initial stealing attempt was quickly repulsed and no other gulls mobbed the food did the original gull retain control. It may therefore have been advantageous for these Herring Gulls to selectively forage for smaller pieces of food.

Category II trials showed that gulls who fed by watching other gulls forage stole from birds who had found a large piece of food. The thief, in some instances, climbed over the unoccupied food container in order to steal another's food. Thus, some gulls stole from others even when food was abundant. These gulls may have expended more energy to steal than would have been required simply to forage.

When many gulls are at a highly concentrated food source, the chances of encountering a feeding gull are high. The birds could react to each other either as an easy source of food or, socially, as another member of the same species. Also, with abundant food available, an individual may be likely to give up its food, since it will in all likelihood soon find more. Further, with high concentrations of both gulls and food, the probability of seeing a gull eating a piece of food with long handling time is high, increasing the likelihood of a successful theft. Combined, these conditions could make food theft a tempting option to a gull instead of feeding for itself, given some nutritional or social benefit.

Our findings support Kushlan's (1978) proposed theory for theft in egrets. With egrets in the Everglades, while food theft was not energy efficient, when food is plentiful, animals may only need to eat enough to survive and not maximize food intake continuously. In a second study with egrets, Caldwell (1980) suggested that food theft may also provide the thief with a foraging site. While this may be true for egrets, it is not the case for Herring Gulls at a dump, where, once stolen food is consumed, more is not likely to be found in the same spot.

Stealing food is apparently a nonrigorous method of foraging (Kushlan 1978) and, in this case, it did not confer the benefit of a better foraging site. Intraspecific robbing may nevertheless offer Herring Gulls some advantage not specifically related to procuring food for nutrition. Gulls are highly social birds and have evolved many displays to convey intraspecific dominance information (Tinbergen 1959). Herring Gulls also occasionally defend feeding areas (Drury and Smith 1968). Possibly, when food is abundant, defense of feeding area has evolved into thievery as an expression of dominance. Theft/dominance could be used either to reinforce existing dominance or to redefine a previous social order.

Another factor contributing to Herring Gull food theft could be the "grass is greener" effect, as demonstrated by cattle, horses, and some domestic dogs. In essence, if another member of the same species spends time eating a given food item, that item must be better than average and therefore worth appropriating. Theft/dominance would not only procure possibly high quality food for a gull, but would also deprive a subordinate individual of that item.

Our study demonstrates that Herring Gulls frequently choose to steal from each other when food is abundant. If nutritional factors were the sole force prompting theft, one would expect gulls to forage on their own under these conditions. This suggests that social dominance as well as behavioral elements may have been important in the evolution of theft.

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