

# The effect of dish and cutlery reduction on dishwashing behaviors in a multi-age household

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## Introduction

The subjects, female age 44 (F44), male age 54 (M54), female age 12 (F12), and male age 8 (M8), live together in a one-family home with no dishwasher. F44 finds the kitchen sink stacked high with dirty dishes every evening. She then proceeds to wash all dishes. This is a daily source of irritation. M54 consistently washes his own dishes directly before and after use but spontaneous washing of dishes outside this period immediately before or after personal food consumption is unpredictable and infrequent (this is according to F44 and is disputed by M54). F12 has been infrequently observed to wash a single dish or piece of silverware. M8 has never been observed to wash a dish or piece of silverware while in the household although reports from school suggests that he does exhibit this behavior in other settings.

The experimental goal was to increase dishwashing behaviors in M54, F12 and M8. The experiment started January 1, 2010.

## Methods

The number of dishes in the household will be restricted by F44 to an initial minimal number of dishes and then over the period of four months, the number of dishes will be slowly reduced. These experimental manipulations are to be done without informing the other household members. Previous household experiments by F44 have established that M54, F12 and M8 are completely oblivious to their household surroundings and are unlikely to notice.

As part of the experimental treatment, F44 will also stop nightly dish-washing. If asked by F12 or M8 to wash a dish, F44 will respond in the following manner. F44 will state that the scrubber is by the faucet and afterward pretend to be absorbed by other activities. Such behaviors are fairly common by F44 and subjects should not find them noteworthy.

During the experiment, subjects will not be asked to wash a dish directly; instead a comment regarding the location of the scrubber will be made. Furthermore, F44 is to make no comments about dirty dishes in the sink or to give any indication to other household members that their environment is being manipulated.

## Results

**Week 1-2:** Dishes are reduced to 4 plates, 4 bowls, 4 mugs, 4 glasses and 4 each of spoons, forks, and knives (Figure 1). Observations: As expected, M54, F12 and M8 do not notice the change in plentifulness of dishware and cutlery. Neither do they notice that the ceramic dishware has been replaced with plastic. All dishes quickly become dirty and are stacked in the sink—except those washed by F44 or M54 directly after use. The following effects are observed in F12 and M8. F12 stares at the dirty dishes in the morning and then decides to eat a bagel and cream cheese instead of cereal. M8 stares at the dirty dishes. While standing at the sink, he asks F44 (who is on the other side of the room) to wash him a dish and spoon for cereal. F44 anticipated this and responds as planned. M8 returns to the kitchen table and whimpers that he is hungry. After some period, F44 washes him a bowl and spoon.



Figure 1: Experimental treatment, month 1. Dishes are reduced to a starting level of 4 each. All other dishware is removed and hidden from the test subjects, who actually do not notice the change.

**Week 3-4:** Dish number as for Week 1-2. Observations: M54, F12 and M8 still have not noticed the change in the abundance of dishware and cutlery. Sink is still stacked with dirty dishes. F12 now stares at dirty dishes but then washes a spoon and uses mug or glass for cereal. M8 stares for a long time at the dirty dishes and then at the scrubber. He then searches for a bowl alternative (glasses, mugs, tupperware) and eats with hands. See Figure 2. Depending on her mood while watching this behavior, F44 may wash him a spoon. M8 also continues the behavior of standing at the sink, and then asking F44 to wash him a bowl.



Figure 2: Example of alternative dishware used by M8. In this example, M8 has used the top of a thermos and a fork to eat his cereal. M8 stared at the dirty bowls for some time and then dug through the shelves to find the thermos and remove the top. The time required was likely greater than that to wash a bowl and is a reflection of the intense resistance to bowl-washing behaviors exhibited by M8 during the early stages of the experiment.

**Month 2:** Dishes are reduced by 2 plates, 1 glass and 2 forks and knives. Current total is 2 plates, 4 bowls, 4 mugs, 3 glasses and 4 spoons, 2 forks, and 2 knives. Observations: M54, F12 and M8 again do not notice the reduction in dishware and cutlery. Sink is still stacked with dirty dishes. F12 begins to wash a bowl and spoon if no clean ones are available. M8 is observed to wash a spoon (a single occurrence during month 2). M8 continues to ask F44 to wash him a bowl, but not while standing at the sink. F44 leaves the dirty dishes in the sink as specified by the experimental design, but is observed to organize the dirty dishes by moving all dirty silverware to one side with the handles all facing the same way. This appears to be a coping mechanism for F44.

**Month 3:** Dishes are further reduced by 1 mug, 1 bowl and 1 glass to a total of 2 plates, 3 bowls, 3 mugs, 2 glasses and 4 spoons, 2 forks, and 2 knives. Observations: M54, F12 and M8 do not notice the reduction in dishware and cutlery. Sink is still stacked with dirty dishes. F12 now washes a bowl and spoon if clean ones are not available. F12 still occasionally uses non-standard dishware (mugs, glasses) in lieu of washing a bowl. M8 is observed engaging in spoon-washing behaviors with greater frequency. M8 continues to ask F44 to wash him a bowl in the morning and resorts to a bowl-alternative when F44 is unresponsive. In all cases, F12 and M8 will choose a clean available dish over washing a dirty dish, however the presence of a clean dishes appears to have no effect on M54 behavior. In M54's case, choosing a clean dish or washing a dirty one appears to be a random choice.



Figure 3: Experimental treatment, month 4. These are now the only dishes available to the test subjects. Amazingly, they still have not noticed that there are hardly any dishes in the house.

**Month 4:** Dishes are further reduced by 1 plate, 1 bowl, 1 mug and 1 spoon to a current total of 1 plate, 2 bowls, 2 mugs, 2 glasses and 3 spoons, 2 forks, and 2 knives. Observations: M54, F12 and M8 still have not noticed the reduction in dishware and cutlery. Sink has fewer dirty dishes in it since there are few dishes available. F12 is consistently washing bowl and spoon when no clean ones are available. However, F12 is never observed to wash a dish after use. F12's use of non-standard dishware is now infrequent. M8 is consistently exhibiting spoon-washing behaviors and begins to occasionally exhibit bowl-washing behavior. However M8 avoids bowl use when possible by eating directly out of cans or eating a microwaveable pizza.

## Discussion

Although M54 consistently washes his personal dishes, spontaneous collecting and washing of dirty dishes distributed throughout the house was unpredictable (according to F44). F44 had conjectured that the abundance of dirty dishes in the sink would be positively correlated with spontaneous dish-washing (and -collecting) by M54, and thus this variable could be manipulated to increase both the frequency and predictability of his spontaneous dish-washing behaviors. However dish-washing behaviors in M54 were entirely unaffected the the total number of dishes or the presence of dirty dishes. The motivating factors for dish-washing behaviors in M54 remain unclear.

F12 and M8's dish-washing behaviors were more malleable and showed significant increases during the experiment. Still, M8 showed considerable resistance to dish-washing, especially bowl washing. M8 exhibited extensive use of non-standard dishware and alteration of food choices in order to avoid bowl-washing. Spoon-washing behaviors were not observed in M8 until fully 1-month into the experiment. Occasional bowl-washing behaviors were not observed until after 3 months of experimental treatment. Initially, F12 also exhibited non-

standard dishware use and changes in food choice, but never exhibited food intake reduction to avoid dish-washing. After 1-month of the experimental treatment, F12 was consistently exhibiting spoon-, bowl-, and glass-washing behaviors and had returned to pre-experiment food choices.

The household members showed different patterns of awareness of dirty dishes. F44 relied on an individual-based model, and knew the exact locations of all dirty dishes throughout the household at any given time. This was in contrast to F12 and M8 who were unable to recover dirty dishes left throughout the household unless specifically told the location and number of dishes to recover from that location. M54 was able to recover dirty dishes but was not aware of their individual locations but rather relied on a probabilistic model with an informative prior probability distribution for dirty dishware location.

## Conclusions

Though F12 and M8 showed malleable dish-washing behaviors, F12 and M8 quickly reduced dish-washing behaviors when F44 resumed nightly washing of dirty dishes after 4-months. This suggests that maintenance of dish-washing behaviors in F12 and M8 are subject to regression and will require continued limited access to clean dishes. After four months, the family appears to have adjusted to the severe dish limitations and has adopted a turn-taking style of dishware sharing. Overall the experiment successfully increased dish-washing behaviors in F12 and M8. Although dish-washing by M54 was not affected, the number of dirty dishes distributed around the household was greatly reduced due mainly to the overall lack of any dishes, clean or otherwise. The experiment also had the side effect of reducing dirty dish accumulation outside of the dining room due to F12's and M8's avoidance of bowl-use when such use required bowl-washing.

*Dr. E. E. Holmes*

## Acknowledgments

Comments by three anonymous reviewers and the journal editor greatly improved the manuscript. Numerous experts in the field gave helpful comments and encouragement during the experiment.

## Reviewer discussion

*Expert M47:* M47 is intrigued. F44 reports observations but not perceptions. M47 finds the behavior of F12 and M8 predictable and uninteresting. Results

from m54 are lacking from month 4. The author appears to interpret F44's observations of M54, F12 and M8 as reality. That is, the author adopts the idealistic approach, in which the author can verify little except F44's own experience of the world, and can never directly know the truth of the world separate from that. In this case, however, M54's reality may deviate from idealistic, and instead a consensus reality is more appropriate. Thus, I suggest rejection of this manuscript with the option to re-submit, assuming that in revision, the author can adequately create a consensus reality that includes M54. Because, as the author has inferred, if M54 does not perceive dirty dishes, there are, in fact, no dirty dishes.

*Rejoinder by the author:* In response to Expert M47. The author thanks the reviewer for helpful comments that will assist in the revision. The exposition of the manuscript was obviously unclear with regards to F44's personal views regarding M54 perceptions. F44 professed no understanding whatsoever of the perceptions of M54 regarding dishes, dirty or otherwise. Nonetheless, she did state that M54's perceptions of dishes appeared to be considerably different than her own. F44 reported M54's behaviors in response to the experimental treatment applied. The mechanisms that led, or did not lead, to behavioral changes remain unclear. The author did not mean to imply a mechanistic behavioral model had been assumed. The manuscript will be revised to make this clear.

*Response by the editor-in-chief:* I would like to remind you and Expert M47 that his comment about him finding "the behavior of F12 and M8 predictable [sic] and uninteresting" is precisely what the point of your paper SHOULD be. As stated in our Guidelines to Authors, "[this journal] publishes papers from a wide variety of family types (eg, single-parent to communal), but the emphasis should be on methodologies used to affirm predictable behaviour more than the description of new behaviours." Furthermore, as identified by Expert M47, any "consensus reality" must also include the reality of M54. However, my opinion is that attempting to assess M54's true reality via direct capture/interrogation would compromise the entire experiment in such a way as to completely bias the results. The remote sensing approach employed here appears to minimize subject self-biasing, and thus, preserves the overall integrity of the study.

*Second rejoinder by author to clarify the first rejoinder:* The 4-month experiment was not designed to contrast M54 and F44's consciousness nor perceptions, but rather to study dish-washing frequency in response to persistent and high numbers of dirty dishes and low numbers of clean dishes. The focal subjects were actually F12 and M8, whose dish-washing behaviors have shown low plasticity in response to other efforts by both F44 and M54. The extremely high resistance of M8 to bowl-washing as

opposed to spoon-washing suggests that a tactile cue – an aqueous substance on the skin – is the mitigating factor for resistance to bowl-washing by M8. This may also be a mitigating factor in other areas of hygiene deficiency in M8.

*Response by Expert M47 to the rejoinder and the rejoinder to the rejoinder:* I have reviewed the revised MS. I appreciate the author's response to my concerns, and I feel that the revised manuscript adequately clarifies the hypothesis under investigation. However, this reviewer feels that further clarification about which dishes were washed when would enhance the paper and extend its generality. For instance, during Month 4, did the lone plate generate more attention than the multiple dishes from F12 and M8? Did F12 and M8 alter their foraging behavior in response to the decrease in plates vs. the decrease in bowls. Had the experiment reduced bowls to 1 and maintained plates at a higher level would cereal and soup consumption decline or would that reduction be compensated for with non-traditional liquid holding devices? Finally, I would be interested in a follow up experiment that increased the number of bowls and plates. That is, what size mound of dirty dishes would elicit increased washing behavior?

*Rejoinder to the response to the rejoinders:* To Expert M47. I believe that comparison of month 1 and

month 4 sheds some light on the effect of higher numbers of dirty dishes on F12 and M8 behaviors although the response is confounded by the non-random exposure time difference between those two treatments. Nonetheless, it was observed that in month 1, the sink was full to the brim with all 16 dishes and 16 cutlery at all times. The use of non-standard dishware appeared to be prompted in part by difficulty accessing desired dishware. F12 and M8 show a general reluctance to touch dirty dishes. They tend to touch the dishes on the edges and hold them distant from their bodies while cleaning. Digging through a sink of dirty dishes presents a considerable deterrent to dish-washing especially spoon-washing since those tend to find their way to the bottom of a sink of dirty dishes.

*Final response from the editorial office:* Thank you for submitting your manuscript to "The Annals of Probable Family Behavior." I have received comments from 2 reviewers, both of whom are experts in the field. I have also reviewed the paper myself. Based on the recommendations of the reviewers and my own opinions, I have decided to accept your manuscript without need for further revision. I congratulate you on a nice piece of research employing novel methodology.

Sincerely, Lance T. Manion, Ph.D. Editor-in-chief