

## Teens and Pets as Participatory Design Partners

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**Abstract:** Participatory Design (PD) aims to minimize the unintended consequences of designs and innovations by inviting users to engage in the process (Muller & Druin, 2012). Designing with some users—for example, pets—is challenging because pets communicate in unique ways. But it holds promise because pets and humans are companions. Expecting teens' relationships with pets to motivate them to be co-designers, we organized a virtual summer workshop engaging teens in activities to understand their canine and feline pets better and design an experience to improve their pets' lives. We analyzed video recordings of teens' engagement at the camp and their descriptions of their experience design projects using qualitative thematic analysis. We found that caring and loving relationships with pets are also contexts for engaging in a systematic design process.

### Introduction

Professionals such as engineers, designers, and others create designs and processes that affect many lives in different, often unexpected ways (Dreyfuss, 1955; NAE, 2004). In this respect, their work is problem-solving and decision-making to specific ends and, hence, exercising power (Bratteteig & Wagner, 2012). To exclusively consider professionals' singular perspectives imposes on users who can reject these propositions. Acknowledging the need to make designs fair and equitable, Participatory Design (PD) includes those affected by designs and innovations in the decision-making process (Muller & Druin, 2012). However, PD relies on the assumption that participants will explore and express ideas to engage in a co-design process given the opportunity to do so. Such an assumption expects specific modalities of participation and underscores the challenge of including those who engage differently. Hence, recent developments of PD aim to develop the agency of participants (for example, Ehn, 2008). In this paper, we study human teens engaging in experience design with canine and feline pet participants to solve a problem experienced by the pets. We situate our work in the notion of *becoming with* (Haraway, 2008) to reference the interactions between humans and their pets in a shared (Bratteteig & Wagner, 2012), situated, but fluid context where animals and humans are companions who become better *with* each other. Because of the explicit need to be and design together, this framing of the teens' work with their pets aligns with our goal in two ways. First, we study the design process that teens *and* pets go through to create an artifact aimed to solve a problem in the pets' lives. Our focus here is on the systematic process through which teens generate, evaluate, and specify for a defined purpose while satisfying a specified set of constraints (Dym et al. 2005). Second, we examine how the teens as co-designers pay attention to the pet co-designers' preferences and the consequences of their work. Specifically, we answer the research question: What aspects of the design process and the pets' preferences do teen participants pay attention to?

### Methods

#### Overview of study

This study is part of a larger design-based research initiative focusing on scientific inquiry around pets' experiences and focuses on a two-week virtual summer camp that situated design work within adolescents' home environments with their pets (Kelly et al. 2021). At the workshop, the participants engaged in the following. First, an investigation of their pet's senses and behaviors using two tools – a set of two Snapchat filters called DoggyVision (DV) and KittyVision (KV) that approximate the differences between human and pet vision, and a paper model of animal pinna to be worn as human ear accessories. Second, an investigation of their pets' personalities documenting how their pet interacts with things around them in certain situations. Third, an experience co-design project aimed to solve a problem in their pets' lives. During camp, we met with participants as a group for an hour each morning over Zoom to orient them to the design activities and asked them to share their progress. Nine teens, four cats, and five dogs participated.

#### Data collection

We saved participants' work including text, photographs and videos, and drawings. This gave us an archive of the work participants did outside of our synchronous sessions. We recorded all Zoom interactions and exit interviews with nine participants.

## Data analysis

We conducted qualitative thematic analysis to understand the participants' design progress through their workshop presentations and project videos. We looked for their engagement in the Engineering Design Process (Dym et al. 2005) and participatory design (Muller & Druin, 2012) with their pets. We further looked for how these two practices related to each other in the teens' design work.

## Findings

In the following paragraphs, we detail two human-pet teams' work on the experience co-design project. Violet and Adriana are both thirteen-year-old human female middle schoolers, energetic and caring pet companions. Billie (female) and Wally (male) are canine companions with distinct personalities and preferences. In the descriptions of their co-design that follow, we detail both human and pet participation in the design process and then analyze some strengths and limitations of their participation and the outcome.

### Violet and Billie's Multi-Use-Toy

Violet hikes and plays with the very energetic dog Billie frequently as a loving companion, but Billie has too much energy for Violet and others to keep up. The family has purchased several toys to keep Billie's playtime needs in mind, but Billie plays with only a few. To help Billie expend her energy through play and have one great toy instead of several, Violet decided to make a "Multi-Use Toy" (MUT). Violet's initial plan was to add a squeaker and a rope to a Kong toy so that Billie could play tug, squeak the toy, and get treats (Figure 1a). However, once Violet started working on the plan, she found it difficult to add a rope to the Kong without destroying it. Violet further wondered where the squeaker would go and if the squeaker was a choking hazard. Facing these challenges posed by the material constraints of toy construction, Violet changed her plan. Violet decided to use multiple layers of felt and sew a couple of layers to create a pocket to hold the squeaker. This way, Billie could squeak the toy as much as she wanted to without dislodging the squeaker and choking on it. Violet inserted treats into the layers and tied a rope to the toy to play tug. The squeaker worked just fine, and Billie used it frequently; Billie also played tug with the rope. Unfortunately, the treat was too snug a fit for the folds of fabric. Violet did not like that it took Billie half an hour to take the treat out and that by then, the toy was slobbery and unsuitable for a game of tug. Violet loosened the folds of fabric to make it easier for Billie to take the treat out. Once Violet modified the design of the MUT, Billie liked it so much (Figure 1b) that Violet got tired of the squeaking sound and had to hide it.

Throughout the design process, Violet's attention was on accomplishing everything that Billie liked about playing with toys and some practical goals for herself. When she began working on her project, Violet realized the limitations of her skills in following through with the original modified-Kong idea and quickly changed her plan to one that would serve the same goal but with relatively fewer challenges. Once she had a prototype ready, Billie played with it and the nature of Billie's play with the MUT gave Violet feedback on the design. Violet saw Billie's unwillingness to share the toy with the family's other dog and her constant use of the toy as signs of approval of the design. However, Violet could not investigate if Billie liked one aspect of the toy more than the others for two reasons. First, her design had multiple elements and Billie responded to each of these so enthusiastically that it was difficult to imagine that any one affordance of the toy would be less desirable to the canine than others. Furthermore, Violet was unable to think of a solution to the problem of Billie constantly squeaking the toy, or how saliva coated the toy. She expressed the need for further improvements such as a good fit for the treats and a better way to play tug with the toy, but was happy to see that Billie was excited to have the toy, which Violet made especially for her.

### Adriana and Wally's Cozy Crate

Adriana and Wally are loving companions who could not be more different from one another. Wally is quiet, shy, prefers cuddles to active playtime, and loves enclosed spaces. Adriana as a human companion is energetic, bright, and full of ideas. Adriana observed that Wally would crawl into small, enclosed spaces between furniture and under chairs and wondered if Wally needed some time alone. Hence, Adriana wanted to create a comfortable, enclosed space for Wally to enjoy. Since crates are difficult to make, she decided to modify a crate that the family already owned but never used. She began by planning - the crate would have a mattress pad covered by a colorful towel-one that Wally could appreciate despite his selective color blindness, a small pocket on one of the sides of the crate for a phone attached to a paper cone to amplify the music. Adriana carefully attended to the design of

each component, but she faced some problems. The paper cone amplifier worked, but the phone connected to the amplifier did not fit into the pocket; the crate pad covered with the soft towel fit into the crate, but not the pillows. In Adriana's mind, the biggest problem was not that she had to modify her design plan, but that Wally kept trying to get into the crate, even before it was even half-ready. Adriana wanted to finish her work on the design before Wally began using the crate.

Adriana's plan for the crate was based on her knowledge of the dog's likes and dislikes, but Wally's repeated efforts to get inside the crate indicated that he liked the crate just with the crate pad. Wally probably did not appreciate the speaker for the music, the pillows, or the towel. While he approved the crate long before it was done according to Adriana's plan, Adriana carried on the project. At one point, when Adriana returned after a break, she found Wally in the crate with a look that she thought seemed to say, "Why are you staring at me?" Later, when Adriana completed the project to her satisfaction, she acknowledged that Wally might have "liked the crate anyway." However, now that the project was complete, she was sure that he liked it with the accessories better. In Adriana's words, Wally was her "collaborator and test subject." She knew that this was the case because when the humans were not around, Wally went right into the crate to spend some time alone. It seemed like Wally had finally found his own quiet spot.

**Table 1**  
*The process through which Adriana and Wally made the Cozy Crate.*

Design stage	Adriana's contribution	Wally's contribution
Problem identification and research	Adriana noticed that Wally likes tight spaces, and Adriana's home does not have such a space.	Wally often sits and lays down under and between furniture when he needs quiet and alone time.
Develop possible solutions and identify the best solutions	Adriana wondered if Wally might like a crate. The crate needs to be comfortable with a soft crate mat, a towel, some pillows, and a speaker for music. Adriana created a plan and sketched her plan in detail.	Wally tried to get inside the crate when Adriana took breaks from working on preparing the crate. This indicated a preference for the crate.
Construct prototypes, test, evaluate	Adriana added a pocket to the side of the crate into which a phone and a speaker could go. She made a paper cone speaker. The amplifier/speaker combination worked but did not fit into the fabric pocket she had made. She covered the crate mat with a towel in colors that Wally could see.	Wally continued to try to enter the crate and spend time inside it when nobody was around. This indicated a preference for the crate.
Redesign	Adriana discarded the plan to add a pocket for the phone and the paper cone speaker. Instead, she left a small Bluetooth speaker close to the crate. This way, Wally still could enjoy music while in his crate.	Wally went into the crate when Adriana allowed her to and stayed there.

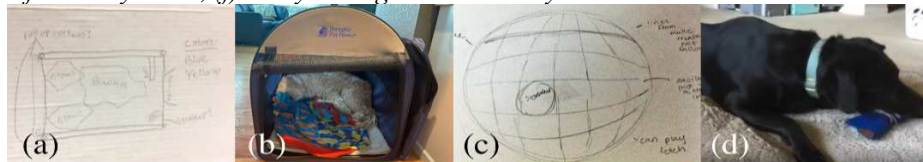
Violet and Adriana co-designed projects with their pets, but the way and extent to which they engaged in the process differed. The pets' personalities differed as well, affecting the co-design process. For example, Violet and Billie worked well as a team. Violet was attentive and loving, Billie, also loving, responded to all active play-like situations enthusiastically. In fact, Violet mentioned that Billie greatly enjoyed active play and hence, that was what they engaged in. However, once they began playing, Billie hardly said no to anything, accepting all playtime invitations from Violet and this posed some challenges for Billie in the role of a co-designer. How would Violet know if Billie liked one toy or form of play (chewing, squeaking, and tug) more than the others? Billie's response to every iteration of their MUT project was an emphatic, "Yes!" Although this is the outcome that Violet had hoped for, for the purpose of creating successful toy designs, it might have been helpful for Violet to present Billie with one choice at a time, or to present Billie with some gentle but unfavorable choices. This way, she would know how Billie reacts when disappointed.

Adriana was more energetic and vocal than the shy Wally. Wally liked tight spaces to squeeze into and Adriana responded to his need by designing a crate with pillows, blanket, crate padding, pleasing colors, and music (Figure 1c). Adriana does not provide a reason for including the pillows and the music and it appears that

these are things that she likes. Wally liked Adriana's initial design; however, Adriana failed to notice that Wally liked the simple crate long before it was ready, according to the design plan. Wally kept trying to lay down inside the crate and rest, and Adriana kept asking him to go elsewhere so she could have enough time to complete their project. When the project was indeed ready, Wally had permission to use it and went in (Figure 1d); Adriana saw this as a sign of Wally liking the final product.

**Figure 1**

(a) Violet's design sketch for the MUT, (b) A prototype of the MUT by Violet, (c) Billie playing with the MUT, (d) Adriana's design sketch for the Cozy Crate, (e) A prototype of the Cozy Crate, (f) Wally resting inside the Cozy Crate.



## Discussion

Our findings indicate that face-to-face interaction with animals in practical contexts familiar to humans and animals can serve as contexts for systematic problem-solving and design. In both examples, the human designers were guided by dogs' prior behaviors, their own hypotheses, the pet's interest during the design process, and the pet's use of finished objects. Although designing for pets often assumes animals as passively subjected to decisions, we see that humans *and* non-humans can co-shape design through interactions with designers. Animals' co-shaping design of objects that are then used for them can imply a better quality of life for them and a more reflective human practice (Schön, 1983). The challenge, however, is in identifying ways that co-designers, in this case dogs, let their opinions and experiences be known. What does it look like when a dog shares its perspectives and inspiration with humans? How can humans read these to incorporate them into their designs? Wally and Bobbie were inquisitive co-designers, ready to use every prototype, but Vivian and Adriana, as human co-designers, interpreted these situations differently. Further, Vivian and Adriana had unique ways of listening to and being with their dogs resulting in different ways of being with. The designs turned out well and have promise, but the nature of these two co-design experiences indicates that co-designers have unique personalities that affect their communication. Therefore, we need to develop the valuable capacity to communicate with co-designers.

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