“DO YOU SEE WHAT THEY SEE?”
A NEW APPROACH TO VIDEO ETHNOGRAPHY

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BACKGROUND

User study has played a critical role in the practice of industrial design since the emergence of the profession early last century. Henry Dreyfuss was a pioneer of user study; for example, he arranged to get behind the counter in the clock section of a drugstore to observe how people selected and purchased a clock (Dreyfuss, 1955). According to Niels Diffrient, a partner at Henry Dreyfuss’ firm, the responsibility of a product designer is to learn more about people, find out how they feel about things, and then design for people’s needs through the design process (Conway, 1973).

Leonard and Rayport (1997) identify the five key steps in a design process as: observation, data capture, reflection and analysis, solution brainstorming, and possible solution prototype development. Since observation lays the foundation of industrial design, its effectiveness in discovering insights to the real emotions and behaviors of users is vital to the success of user-centered design. Observation was characterized by Adler and Adler (1994) as “the fundamental base for all research methods.” The observation research findings are then reflected upon and interpreted to inspire the designers and catalyze their creative problem solving process.

Ethnography is a research method based on observing users in their natural environment rather than in a formal research setting where people tend to act differently from their true behavior. However, people are often “poor observers” due to the frequent limit of objectivity and precision (Collier and Collier, 1986). Therefore, instruments such as a cameras or video cameras are essential in gathering accurate visual information for observational research. Since the introduction of camcorders in the 1980’s, visual ethnography has been increasingly used by researchers to study people in their natural environment in a less intrusive manner. Even though sequences of still photographs can record events, only the fluid imagery of film and video can reasonably convey the full emotional quality of human activity, according to John Collier and Malcolm Collier (1986). Designers also started using video ethnography as an observation tool because it can capture subtle, fleeting body language that may convey large amounts of information that may be stored for future review and analysis (Leonard and Rayport, 1997). Video ethnography has been an effective observation tool for capturing, recording, analyzing, and presenting user needs and problems. It is used not simply to record data, but also, as Pink (2007) states, as a medium through which ethnographic knowledge is created.

THIRD-PERSON POINT OF VIEW VIDEOGRAPHY

Conventionally, third-person point of view videography (POVV) has been a primary method used by designers to perform video ethnography. It captures the movement of users from a third person perspective with a video camera. The video camera can be mobilized by the observers for dynamic view changing, or it can be stationed in a strategic location for extensive motion recording. In this method, researchers still have the discretion of exercising various levels of participation in the users’ actions. Although third-person POVV is able to capture details of the user’s movements, it does not provide designers with the user’s own visual perspective. Some of the user’s perspectives, such as line-of-sight and shift-of-view, are not precisely documented in third-person camera angles. In other words, the observers are not able to see what the users are seeing, even though they have clear understanding of what the users are doing. These missing perspectives from the observation phase of the process might often adversely impact the success of subsequent phases in the empathic design process because the interaction between a user and a product is not sufficiently captured during the entire process, even though it is a key to discover areas for enhancing user experiences through design. For example, when operating a device with multiple control units to perform a specific task, the user’s interaction with the arrangement of these controllers provides essential clues to a designer’s attempt to create an intuitive layout. Through third-person POVV, researchers might be able to detect the delay or confusion in a user’s interaction with the controllers, but it will be difficult to identify the problematic areas without witnessing the user’s viewpoint.
FIRST-PERSON POINT OF VIEW VIDEOGRAPHY

Ethnographers have put video camera in their subjects’ hands for years to produce first-person videos, such as video diaries according to Pink (2007). Ruth Holliday (2000) stated that a video diary “not only captures the narratives of experience and lived cultural practices, but also the visual nature of the construction and display of identities through the use of cultural products.” In order to study what the users see in a human-computer interface, interaction designers have also been using eye tracking techniques since the 1930’s, suggest Jacob and Karn (2003). However, product designers are more interested in understanding users’ behaviors and response when using a product in the natural setting, where users should have both hands available without any confinement. Video diaries require users’ hands to operate the video camera while eye tracking devices constrain users’ freedom of movement. The size, weight, control, and image quality of conventional video cameras have been the obstacles of the adoption of first-person POVV ethnography of users.

The advancement of technology in recent years has dramatically reduced the size, weight, and cost of video cameras, even of those equipped with very high resolution. These advancements enable the possibility of wearable high-resolution video cameras for the convenient creation of first-person POVV. Industrial designers are now able to place the small wearable video cameras very close to users’ line-of-sight and see what the users are seeing while having their hands free to use the products the way they normally do. The first-person POVV starts a new chapter of user ethnography by providing the users perspectives that have been missing in the third-person POVV.

THE PROJECT AND METHODOLOGY

This paper presents a case study that compares the differences between using third-person and first-person POVV in the empathic design process of portable generators. The client of this design project is a major US portable generator company. The goal given to a team of six industrial designers was to discover the areas that user experience can be improve and to create designs that can enhance the product/brand value. Portable generators are usually purchased by users to generate electricity by gasoline engines during power outages or while engaging in outdoor activities. User’s experiences with the generator begin with the interaction between the product and potential buyers in store, and are followed by bringing home the 200 pound generator in its box after the purchase, putting together the generator, starting the generator, using it to power appliances, and performing maintenance and repair when necessary. The process of assembling and initially starting the generator is a particular focus of this study, as requested by the client, not only because the interaction between a user and the generator is more intensive initially than in other phases of interaction, but also because many shoppers return their newly purchased generators back to the stores out of frustration resulting from this process.

In order to produce an in-depth understanding of user’s physical, cognitive, and emotional activities during the assembling and starting process, the designers decided to use video ethnography to build the knowledge base for their empathic design practice. After a group brainstorming session, both third-person and first-person POVV were used to capture the activities from both the users’ and designers’ perspectives. None of the six designers had any previous experience with portable generators, so they were able to perform the task as first time users. The six designers formed three teams, with two members on each team. Each team was responsible for documenting the process of opening, assembling, and starting a brand new portable generator directly from the box provided by the client. One designer on each team used third-person POVV, and the other team member used first-person POVV as their video capturing and documentation method.

The designers opening the box wore video cameras on their foreheads. Some designers used their iPhones because of their compact size and clear image quality. A light-weight holder was created to attach the small video camera or iPhone as close to the operator’s eyes as possible. Before the process began, the designers adjusted the location and angle of the video camera by wirelessly synchronizing the camera’s view with a computer screen to ensure the consistency of line-of-sight of their eyes and the camera. The designers started the observation process after they were comfortable with the camera on their forehead and satisfied with the consistency of views. The other important technique adopted for this exercise was that the operating designers had to conduct a narrative during the process. Basically, they were required to “think out loud” throughout the entire procedure to provide real-time reflection of their thoughts and feelings. This method was found to be
very helpful when the team reviewed the recording later, because the emotional responses were captured throughout the process. The second designer in the team was responsible for videotaping the process using a third-person POVV camera. This particular designer was encouraged to move around to capture all the actions of the operator. Dialogue between these two designers was permitted so that they felt as natural as possible during the process. Figure 1 is a picture illustrating a first-person videographer (on the left) and a third-person videographer (on the right) documenting the assembly experience of a portable generator. Figure 2 displays a screen image from the playback of a first-person video in which one designer is holding a connecting cable for the generator while the other designer performs third-person videography.

After videotaping the opening of the box, the generator assembly, and the initial starting of the generator, both the first-person and third-person videos were studied independently by their producers. The operator reviewed the first-person video and the other designer analyzed the third-person video. They listed all their findings and the problems discovered from the observation through the videography. Then, the designers met to discuss and exchange their findings.

Figure 1. A picture illustrating the first-person videographer on the left, and a third-person videographer on the right, who are documenting the assembly experience of a portable generator.

Figure 2. A screen image from the playback of a first-person video in which one designer is holding a connecting cable for the generator, while the other designer performs third-person videography.
FINDINGS

Using video ethnography, three designer teams documented the assembly and initial use process and their findings for three different models of portable generators. Tables 1 through 6 are the results from the different teams in their original wording. The designers kept their own natural documentation styles to maintain the originality of their perceptions.

Findings for Design Team Working with Generator A

This design team identified many issues with both first- and third-person POVV. Interestingly, this team's first-person POVV identified all the issues mentioned by the third-person observer. However, items 2, 4, 7, and 17 were identified by the first-person observer only (Table 1). Items 2 and 4 were not identified by the third-person video camera because of the tight space deep in the box that only the first-person camera could capture. Item 7 of the first-person POVV list mentions that the instruction diagrams were too small to be read, but this is not demonstrated in the third-person view due to the subtleness of the movement of the first-person observer. The first-person video shows that the designer was trying to get a little closer to have a better view of the diagrams. The design team came out of the study with a larger instruction diagram for the client. The first-person POVV observation list points out that the choke is hard to see (item 17 in Table 1). This problem was identified by in the first-person video because of the shifting of line-of-sight as the designer tried to search for the choke's position. This problem was not discovered in the third-person POVV. Based on this finding, a bigger, different colored choke was designed, and the client is planning to incorporate this feature into all of their portable generator products. Tables 1 and 2 outline the designer observations from the first-person POVV and the third-person POVV respectively.

| 1. No instructions on how to open box, or take the generator out of it. (Time: 1:25 since beginning) |
| 2. Was wrapped in plastic from the bottom. (2:33) |
| 3. The extension cord was stuck under the generator during unboxing. (2:52) |
| 4. The handle was wrapped in bubble wrap and it was zip tied to the bottom frame of the generator. (3:06) |
| 5. The instructions explain how to unbox the generator after it is completely unboxed. (5:51) |
| 6. Had to tilt the generator over so that I could access the bottom in order to install the front leg and the wheels. (7:05) |
| 7. The small diagram is hard to understand in orthographic. The parts not having a part list makes it harder to distinguish quickly. (8:38) |
| 8. Bolt to attach the leg bar is hard to get to because the engine is so close. (10:30) |
| 9. There was a bolt size that they did not say needed a tool. Instructions were lacking. (11:31) |
| 10. The instructions did not describe in what order to install of the rubber feet to the front leg bracket. (12:48) |
| 11. Axle pins were extremely hard to lock into place. (14:20) |
| 12. Instructions do not tell you how much oil to put into the generator. (15:31) |
| 13. Oil is not easy to fill. It is at an angle that makes it difficult not to spill. (17:01) |
| 14. The gas cap was a little difficult to take off. (18:34) |
| 15. The gas goes under the fuel filter when filling the tank. (19:09) |
| 16. The plug covers open upwards, forces you to have to hold the cover and plug it in. (20:11) |
| 17. The choke is hard to see because it is the same color as the box that it is over. (20:56) |

Table 1. First-person POVV observations for generator A.

| 1. There were no directions on the outside of the box of how to unbox the generator and it was way too heavy to pick up to get out of the box. (Time: 00:35 since beginning) |
| 2. The extension cord was stuck under the generator and the handle was connected to the generator by a zip-tie in which we needed a knife to cut it. (02:15) |
| 3. There was no wrench provided for all the nuts and bolts. (03:40) |
| 4. The instruction manual was in the box and it told you how to open the box once you
1. Opening Manual, first flip through, nothing immediately useful. (Time: 2:22 since beginning)
2. Lifting generator out of box with help. (3:58)
3. Discovered generator is sitting on bottle of oil, what if this spilled? (4:23)
4. Thinking out loud "I'm really disorganized." (5:41)
5. Reading manual to set up. (6:32)
6. Pick up wheel axel (to begin wheel setup). (7:43)
7. Open first wheel package. (9:37)
8. Cotter Pin bending. (12:41)
9. Wheels on! (14:45)
10. Unpacking bumpers. (15:36)
11. Confusion with diagram of bumpers. (16:12)
12. Bumper #1 comes off. (18:18)
13. Tightening bumpers with nut driver (no tools came with the generator). (20:35)
14. First test of rolling with wheels-still heavy. (21:56)
15. Putting 1st piece of handle onto frame. (23:20)
16. Attempted putting black handle on end—failed. (23:44)
17. Gave up on black handle. (24:52)
18. 1st handle piece connected. (27:01)
19. Pinched myself with pliers tightening the handle. (28:09)
20. 2nd piece connected, it clanked against the engine. (29:13)
21. Reading about oil filling process. (31:19)
22. Trouble locating dipstick. (32:40)
23. Wipe off dipstick. (34:41)
24. Funnel Problems-discussion about oil and its directions and container. (36:09)
25. Begin Pouring Oil. (39:20)
26. First test of dipstick. (39:50)
27. Finished Pouring. (51:11)
28. Discovered that the funnel twists. (51:26)
29. Finally, oil registers on dipstick. (53:15)

Table 2. Third-person POVV observations for generator A.

Findings for Design Team Working with Generator B

In this group, the first-person observer talked to herself more frequently than her teammate, so she created a much longer list for the first-person POVV than did the third-person observer. In terms of real problematic areas, the third-person POVV discovered that oil was spilled on the frame of the generator when the first-person observer was pouring the oil into the engine. The oil spillage was not noticed by the first-person POVV. Conversely, confusion with the bumper diagram was only identified by the first-person POVV. Tables 3 and 4 outline the designer observations from the first-person POVV and the third-person POVV respectively.
30. Wheeling generator outside. (55:03)
31. Opening fuel cap. (58:57)
32. Begin fueling. (1:00:50)

Needs?
1. How can this process go faster for someone who has no experience with a generator?
2. How can the setup be smooth and not make the user feel stupid?
3. How can the instructions and placement of controls on the generator be helpful?
4. I want peace of mind knowing I'll be able to assemble this thing.

Table 3. First-person POVV observations for generator B.

1. Lift generator out of box with the help of Travis. (Time: 2:53 since beginning)
2. Walk around, squat, and sit to get plastic bag off. Also, sliding generator on the floor some. (3:36)
3. Got Wheels on! (13:40)
4. Self confidence is low as I tighten bumper on. (20:23)
5. Struggling with the black rubber piece for the handle. (23:34)
6. Putting handle piece on. (25:28)
7. Pinched myself with pliers. (27:07)
8. Discussing the handle shape and location. (28:52)
9. Discussion of model put together, talked about form, location of stickers, etc. (0:28)
10. Discussion of fuel cap-what’s the deal with the sticker? (1:00)
11. Handle covers some instructions. (2:24)
12. Pouring oil, paper towels are down for the mess. (3:55)
13. Spill oil on frame. (18:17)
14. Wheeling generator outside. (20:29)

Table 4. Third--person POVV observations for generator B.

Findings for Design Team Working with Generator C

There were also many overlapping discoveries from the first- and third-person POVVs in this team. Again, there were findings contributed to a particular POVV. For example, item 7 of the third-person observation list (Table 6), found that the whole unit was heavy and awkward to move around. When the operator (first-person observer) was trying to maneuver the unit, he might not have noticed his own awkward position, which was clearly identified in the third-person POVV. Based on this finding, a more ergonomic design was developed for easier maneuvering of the generator. However, items 11 and 13 of Table 5 were mentioned only in the first-person POVV because of the user’s perceived difficulty in locating the cable and propping up the unit. Perception is more easily recorded in the first-person POVV because of the swift change-of-view of the observer, and the natural narration of the users. Tables 5 and 6 outline the designer observations from the first-person POVV and the third-person POVV respectively.

1. Damaged box, Not enough reinforcement. (Time: 00:09 since beginning)
2. No instructions on how to take the box apart/remove generator on outside of box. (00:20)
3. Box had to be broken to remove generator. (03:20)
4. Generator had to be lifted to remove plastic wrap from around generator. (04:10)
5. Purpose of some small parts not easily identified. (05:00)
6. Axle hole too low. (05:10)
7. Wheel installation was difficult with only one person. (06:26)
8. Leg installation required generator to be flipped on its side. (10:11)
9. Bolt holes for legs did not line up- had to be forced. (10:33)
10. Clearance of bolts for tightening. (13:01)
11. Negative cable for battery hard to find- not labeled well. (16:52)
12. Negative cable used a bolt to install- a stud and nut would have been more user friendly. (17:31)
13. Hard to prop up on wheels to maneuver. (24:00)
14. Oil capacity not clearly labeled. (28:48)
15. Hard to pour oil. (29:12)
Needs:
1. Better/clear instruction to open box and remove generator
2. Stud and nut for the battery negative cable installation instead of bolt
3. Not clearly labeled where to place foot when propping up to maneuver
4. Needs an oil funnel

Table 5. First-person POVV observations for generator C.

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<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>Confusion on how to open box and remove generator. (Time: 00:17 since beginning)</td>
</tr>
<tr>
<td>2.</td>
<td>Confusion of small parts. (00:59)</td>
</tr>
<tr>
<td>3.</td>
<td>Difficulty removing from box. (03:45)</td>
</tr>
<tr>
<td>4.</td>
<td>Difficult to put together with only one person. (04:43)</td>
</tr>
<tr>
<td>5.</td>
<td>Difficulty putting on wheels and legs with only one person- heaviness. (06:12)</td>
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<tr>
<td>6.</td>
<td>Handle does not lock in down position. (15:05)</td>
</tr>
<tr>
<td>7.</td>
<td>General movement seemed awkward/heavy. (20:57)</td>
</tr>
</tbody>
</table>

Needs:
1. Easier for only one person to assemble
2. Better/Clear instructions
3. Needs funnel for oil

Table 6. Third-person POVV observations for generator C.

**PROJECT CONCLUSIONS**

The findings discovered by the three design teams demonstrate that both first- and third-person POVV, when used simultaneously, generate many similar user experience insights that can be used to create a knowledge base for empathic design. Nevertheless, third-person POVV is able to record findings inconceivable by the users themselves; for example, their postures and activities that are beyond their visual scope. On the other hand, first-person POVV unveils insights and perspectives that third-person POVV misses, especially cognitive and emotional activities. The development of first-person POVV is not intended to replace third-person POVV, but rather to compensate for the areas that third-person POVV is not able to fully capture. The inclusion of both first and third-person POVV in the empathic design process provides a more comprehensive understanding of the user experience. Henry Dreyfuss’s observation adventure of the clock shoppers might have been easier and more effective if these techniques had been available at the time. The more understanding designers can gain from the users, from both their physical and emotional perspectives, the better chance a product has to be designed to meet their needs. This paper presents a case study that might lead to further larger-scale research. The findings from both the first and third-person POVVs in this project resulted in design concepts that will be incorporated in the client’s upcoming product lines.

**REFERENCES**


