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"Two Heads are Better than One": Pair-Interviews for Visualization

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ABSTRACT

Visualization research methods help us study how visualization systems are used in complex real-world scenarios. One such widely used method is the interview — researchers asking participants specific questions to enrich their understanding. In this work, we introduce the pair-interview technique as a method that relies on two interviewers with specific and delineated roles, instead of one. Pair-interviewing focuses on the mechanics of conducting semi-structured interviews as a pair, and complements other existing visualization interview techniques. Based on a synthesis of the experiences and reflections of researchers in four diverse studies who used pair-interviewing, we outline recommendations for when and how to use pair-interviewing within visualization research studies.

Index Terms: Human-centered computing—Visualization—Empirical studies in visualization

1 INTRODUCTION

Visualizations are often situated in complex and entangled socio-technical systems. To understand the role of visualizations in these contexts, researchers employ a host of qualitative methods, one of which is the *interview*. Interviews are employed in visualization studies in a variety of ways, such as a core method in interview studies [1, 2, 12]; as an avenue to inform the design specifications of novel visualization techniques [6]; and, as a method to evaluate and refine visualizations [4, 22].

Despite the prevalence of interviews in visualization literature, there is little written when it comes to the mechanics of conducting them. As noted by Hogan et al., *"researchers rarely explain how exactly the interview was conducted, beyond stating its duration and, sometimes, its 'structured', 'semi-structured', or 'open-ended' character"* [9]. Furthermore, only a handful of interview methods have been proposed that detail specific approaches for conducting interviews in a visualization context [3, 9, 16].

In this work we introduce an interview technique for visualization research called *pair-interviews*. Pair-interviews are interviews conducted by two people, rather than one, with the responsibilities of planning, conducting, and analyzing the interviews strategically divided between two complementary roles: a *driver* and a *navigator*. By reflecting across the use of pair-interviews within four separate visualization studies [1, 13, 15, 21] — Akbaba was involved in two of the studies, and Meyer in all four — we find that the explicit enactment of these roles reduced the logistical and emotional burdens of conducting an interview, increased the engagement with the interviewee, and improved the experience of interview analysis through co-reflection. As a method that focuses on the mechanics of asking questions and directing discussions during an interview, pair-interviewing complements other interview methods used by visualization researchers that instead focus on the interview questions [9], the interview context [5, 10], data analysis during the interview [3, 16], or participant interactions with technologies [19].

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In this paper we distill and contribute our reflections into recommendations for conducting interviews using the pair-interview method within a visualization context. These recommendations center on when to consider making use of a pair-interview, how to distribute interview responsibilities between a pair of interviewers, and how to make use of the pair to facilitate rich and productive analysis. In addition to our main contribution, we also provide a complementary primer as a supplemental website that covers the procedural aspects of conducting pair-interviews [1]. We advocate for the use of pair-interviews in visualization research based on our successes and joys in using the technique across a diverse set of interviewers and contexts.

2 RELATED WORK

Qualitative inquiry and techniques are important for visualization research as they support rich and complex perspectives on the entangled socio-technical factors that affect the design and use of visualization systems [7]. Interviews are a common method in qualitative inquiry with established methods within visualization. And yet, echoing Hogan et al. [9], there is relatively little work written about the mechanics of interviews, with only a handful of explicit techniques proposed. We briefly review the current techniques in this section, with a focus on how each technique draws attention to different aspects of the interview process.

The *elicitation interview* is an interview method that focuses on the questions that interviewers can ask with the intent of helping the participant relive their experience using a visualization in a specific context [9]. The interviewer guides the participant through an iterative series of questions that evoke different levels of detail about the experience — like describing the specific day, how they felt, then what they did — all leading up to the analysis session the participant is recounting. This interview method supports researchers interested in participant experiences that are not tinted by post-rationalization.

The *pair analytics* [3] and *data engagement* [16] techniques focus on how to conduct and study data analysis during an interview. The pair analytics technique supports participants who have data analysis skills to externalize their analytic reasoning in an ecologically valid collaborative setting, while the data engagement technique supports participants who lack data analysis skills in the analysis of their data. In both techniques an analyst who helps facilitate the data analysis is included as part of the interview team. The focus centers on sense-making and analytical reasoning as the analysis is conducted in real time.

Although not visualization-specific methods, *contextual inquiry* [10], *focus groups* [17], and *wizard-of-oz* studies [11] are more general interview techniques that are used in the visualization community. In a contextual inquiry interview, researchers conduct interviews at the physical location where participants work, both asking targeted questions and also passively observing work practices [10]. Critical to this method is that the interviewer will then share their interpretation of the participant's work practices, building an agreed upon description. This method has been demonstrated as an effective interview technique to use with data analysts to understand the role of visualization in their workflows [5]. Focus groups are a technique to capture data from multiple participants at once

[1] https://gotdairyya.github.io/pair-interview-primer/

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in a group setting [17]. With this method, the interviewer actively moderates the group discussion between participants and both the topics discussed and the interactions between participants serve as data sources for the researcher. Another common interview method is a wizard-of-oz study, where researchers take the role of either the interviewer — asking questions and observing participant behavior — or the wizard — producing outputs of a technological system that is not currently implemented. Tory & Setlur use this technique as a pre-design method, understanding user expectations for dialog systems in an analytical context [20]. Conducting this type of study allows researchers to understand user interaction with technology without sinking the cost of development.

Within qualitative research contexts, several other methods specifically focus on the role other people outside of the research team can have in an interview. Similar to focus groups, the *dyadic interview* is when two individuals are interviewed at once, encouraged to discuss questions posed and moderated by the interviewer [18]. Another method is the use of *peer interviewers* [8]. In these interviews, the research team trains an in-group team to conduct interviews with populations that are difficult to reach. Both techniques rely on pre-existing relationships either between the two participants or between participants and peer interviewers to support the interview process.

While these extant interview methods cover a wide-range of interview considerations, none focus on the relationship between multiple interviewers, a point motivating the recently proposed *two-to-one* interview technique from Monforte & Úbeda-Colomer [14]. The authors share their experiences conducting interviews together in a study covering university students, physical activity, and disability, and describe how their close, personal friendship gave fluidity to their roles within the interviews and a richness to their interview interpretations and analysis. They illustrate the many benefits of pair-interviewing like increased rapport with the participant, the ability to question one another's assumptions throughout the interview process, and the support that having another interviewer brought to the interview process. They discuss how they let go of roles as the study progressed, aligning so closely, that they began to interpret the interviews from one another's perspective.

The pair-interview method that we outline in this paper is heavily influenced by Monforte & Úbeda-Colomer's work, but we deviate from their proposed method through the clear identification of roles and distribution of responsibilities between interviewers. This more structured approach provides a framework for a broad range of interviewer experiences and skills and does not rely on a deep personal relationship between the interviewers, but retains many of the benefits described by Monforte & Úbeda-Colomer. In Sect. 4 we reflect across the experiences of conducing pair-interviews in four separate studies (see Table 1) — finding the method beneficial across a myriad of visualization contexts.

3 Methods

We draw our recommendations from four separate pair-interview teams, all of which conducted semi-structured interviews in an academic setting with graduate students or postdocs as the interviewers. The interviews were conducted across a variety of topics and participants: families with asthmatic kids interacting with data from air quality sensors in their homes [15] (S1); visualization design study researchers reflecting on the end of their collaborations [1] (S2); employees at a manufacturing company transitioning to a commercial dashboarding system [21] (S3); and data workers in a broad range of fields discussing how they deal with imperfect data [13] (S4). We provide a brief sketch of the different studies in Table 1 to illustrate the range of visualization contexts these pair-interviews took place within.

The connecting tie across the interview teams is the second author of this paper, Meyer, who was a senior contributing author on all the studies; Akbaba was involved in two of the studies (S2 and S4). We contacted all the pair interviewers from these studies and asked them to respond to a set of reflective prompts. These prompts consisted of 20 questions that covered both the mechanics of conducting pair-interviews and more broad-level reflections to explore the parts of the pair-interview method that worked well, and what did not. Seven of the 8 interviewers completed the survey, including Akbaba. The prompts — which took around 1–2 hours to complete — can be found in the accompanying supplemental website. The recommendations presented in this paper come from our reflections over the responses provided by the interviewers, as well as our own experiences conducting and supervising pair-interviews.

4 Pair-Interviewing

A pair-interview is the process of conducting semi-structured interviews with two interviewers, each of whom take on a specific role and set of responsibilities. Pair-interviewing complements existing interview techniques used within visualization research, and could be used in conjunction with, for example, elicitation interviews, data-engagement interviews, and wizard-of-oz approaches.

In this section we discuss the two distinct interviewer roles — the driver and the navigator — along with the benefits they bring. We also detail the interactions between these roles in planning, conducting, and analyzing interviews. Throughout this section we present a series of recommendations, indicated as (R#), that we derive from the joint reflections of the interviewers across the four visualization studies. These recommendations are summarized in Table 2. To complement these recommendations we provide a primer with more mechanistic details of pair-interviewing on our supplemental website.

4.1 Roles in Pair-Interviews

The focus of the pair-interview method is on a delineation of interviewer responsibilities across two distinct roles. The **driver** is responsible for engaging with the participant, *driving* the interview forward by asking the core interview questions from the interview script. The **navigator** is responsible for keeping the interview on track by actively listening to the conversation, helping the driver *navigate* the interview outline, and offering follow-up questions or suggestions to move on if the conversation goes off-track or time is running out. It is important to note that the navigator is not an assistant to the driver: as peers, both interviewers are responsible for actively conducting and analyzing the interview.

Across the studies the specifics of the roles differed slightly, but in general the drivers and navigators worked together before the study began to generate a shared and mutually agreed upon set of goals for the interviews. They also explicitly allocated responsibility for covering different parts of the interview. For example, some pairs would discuss the amount of time they wanted to spend on interview questions so that the navigator knew when to interrupt a conversation either with a time check or follow-up questions. Piloting interviews was invaluable for becoming comfortable in interviewer roles and with the distribution of responsibilities.

In one group (S4), although the roles were fixed, the interviewers switched roles occasionally if the driver felt off and needed to take a back seat in the interview. The pressure of conducting interviews can be high, especially in circumstances where there is only one opportunity to interview a participant. In our experiences, the pair-interview technique allowed for a redistribution of this responsibility to two people, reducing the emotional strain on any one interviewer.

Thus, we recommend early discussions of what each role is responsible for, not only prior to the start of interviews, but also after a couple, to hone in on the responsibilities that feel comfortable for both interviewers (**R1**). And once these roles are established, we recommend keeping them constant. This allowed us to feel comfortable in the interview process and to develop a routine used throughout the remainder of the interview process. But we also recommend

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Interview-Related						Interviewers
ID	**Interviews**	**Topic of Study**	**Participants**	**# of Interviews**	**% In-Person**	**Navigator**
S1	2017-2018, 2019	how families with asthematic kids use data from an air quality sensing system in their homes	Parents (predominantly mothers)	7	100%	post-doc/ project collaborator
S2	2021	the relationships within visualization collaborations, between researchers and to technology	Visualization faculty and graduate students, domain experts	22	0%	PhD student/ lab member
S3	2021-2022	socio-technical challenges of transitioning to Power BI in a conventional manufacturing company	Managers and workers in a company	19	50%	PhD student/ project collaborator
S4	2022	how data workers cope with imperfect and partial data	Researchers and data analysts in a range of research and industry positions	14	86%	PhD student/ lab member

Table 1: An overview of the different studies that employed the pair-interview technique, informing the generation of recommendations. The Interview-Related columns illustrate the flexibility of the method. The Interviewers column illustrates the composition of the interview team. To read more about the studies: S1 [15]; S2 [1]; S3 [21]; S4 [13].

being open and willing to swap roles for times that the driver may need to take a break if they need it (**R2**).

Across the studies, the driver was the lead researcher in the project — in each study this lead researcher was a graduate student. The navigator was another graduate student or postdoc from the same research group. All pairs reflected that knowing each other beforehand was important because it gave them some confidence that they could work well together. The pairs described themselves as lab mates or work colleague, with one pair (S2) describing the relationship as a friendship. It was evident in the reflections that there was strong mutual respect between all pairs. The pairs reported that this mutual respect led to honest and open conversations, rather than one researcher acting as an assistant to another. Thus, we recommend minimizing power differentials between the two interviewers and seeking pairs with strong, mutual respect (**R3**).

In two of the studies (S2, S4) a senior supervisor recommended specific graduate students to be navigators to explicitly expand their research toolkits with qualitative research experiences and skills. In these instances, the navigator learned how to conduct interviews along with the driver, facilitating both a positive pedagogical experience and a productive research process. As such, we suggest the pair-interview technique as a way to train someone who may be new to interviewing (**R4**).

With two people present for the interview, we found the differences in our perspectives and experiences productive for conducting the interview and also the analysis. In S2, for example, one interviewer was interested in interpersonal dynamics, while the other in tool development. The combination of these two interests facilitated multifaceted discussions with the interview participants, bringing in different perspectives that may have been missed if only one interviewer had conducted the interviews. The studies also benefited during co-reflective discussions, because the different interests of the interviewers resulted in reflections that introduced multiple perspectives into the analyses.

We also found that some similarities between the pair interviewers could amplify power differentials between the interviewers and participants. In S1, the interviewers were two white, graduate-educated, cis-male researchers interviewing mostly women with limited experiences in data analysis. The driver reflected on his experiences of the interviews and questioned whether or not the participants truly felt comfortable and at ease, something the interview pair strove for in their study. He stressed the importance of considering the comfort and psychological safety of participants given the unbalanced power dynamic of two people conducting the interview, a position embedded with power.

Thus, we recommend pairing drivers and navigators strategically with complementary, but varying, strengths and interests (**R5**). These strengths may encompass familiarity with the domain, experience with the participant population, prior experience interviewing, or even different research interests. We also recommend considering how aspects and intersections of interviewer identities can impact how participants feel and respond in the interviews (**R6**).

4.2 Interactions Between the Roles

All of the studies benefited from structural practices that enabled coordination between pairs. They also indicated the value of structured, coordination work before each interview to prepare. The reflections further reveal that an indispensable and highly productive part of the pair-interview technique was the opportunity to discuss, analyze, and debrief within the pair-interview team after each interview.

All the pairs reported that they would spend time together before each interview to prepare and coordinate for the upcoming interview. In S3, the navigator had more familiarity with the participants and would inform the driver about the overall chatty-ness of the participant. This helped the driver prepare to cut the participant short in order to keep the interview on track and on time. In other pairs (S2, S4), interviewers would discuss pertinent context like a high-level overview of the domain of the participant. Across the interview teams, this kind of syncing ranged from informal — chatting on the car ride to the interview (S1) — to more formal — walking through a checklist of relevant information to discuss (S2). Pre-interview coordination was critical to the success of interviews across all of the studies, and thus we recommend dedicating time before each interview to review important information about the participant and other relevant context to the interview (**R7**).

To understand how the pairs coordinated during the interview, we included reflective prompts asking how they stayed in sync and moments where they fell out. One group (S3) noted the importance of eye contact and facial expressions to keep in sync during their interviews. Another pair (S4), however, reported that when they tried to hide their communication from the participant during the interviews, the participant later told them that they noticed the pair's secretive body language and found it illegible and strange. Luckily, this was during a pilot, so the participant felt comfortable providing this sort of feedback. In the other two groups (S1, S2), the researchers reflected on the benefit of keeping the interview like a three-way conversation between the two interviewers and the participant. To keep the conversation feeling natural and inclusive to the participant, we recommend being explicit about communication between interviewers rather than secretive (**R8**). This may look like

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Recommendations	
R1	Define and refine roles early.
R2	Swap roles when necessary.
R3	Find a pair-interviewer based on mutual respect.
R4	Pair inexperienced interviewer with experienced interviewer.
R5	Play to interviewer differences.
R6	Consider impact of interviewer identities on participant.
R7	Review important interview information before interview.
R8	Treat interviews like a three-way conversation.
R9	Discuss interview content and structure after each interview.
R10	Analyze transcripts together.

Table 2: Recommendations generated based on the reflections across four different pair-interview studies.

the driver announcing transitions to different questions or new topics so that both the participant and navigator can stay in sync.

After each interview, the pairs in all of the studies spent dedicated time reflecting on the content of the interview, and its structure more broadly. Members of S2 would often prepare a cup of tea or start eating lunch as they discussed their interviews. They used the post-interview discussions to talk through concerns about the interview structure and plan changes that would better suit the interview goals. Others (S1, S4) reported using the commute time from interview locations back to their offices as their dedicated discussion time. Given the open and ambiguous nature of interviews, we recommend allocating time for a discussion after each interview to discuss what was said during the interview, clarify confusions, and reflect on the effectiveness of the general interview structure (**R9**).

Analyzing the interview content (ie. generated transcripts) often began after a majority of the interviews were conducted. While discussing key insights from the interviews, the pair interviewers relied on one another to recall aspects of the interviews that were not captured in the transcripts — like body gestures, intonation, and facial reactions. This reduced the pressure to remember every detail about the interview. Having a pair-interviewing team meant that in the transcript analysis process, there was a back-up drive — if one person had trouble remembering what happened during the interview, than it is likely that the second interviewer would remember.

In two groups (S1, S2), however, the navigators did not participate in the transcript analysis due to other commitments, but instead attended larger group discussions. In S2, the driver frequently referred to her post-interview notes to check that the transcript analysis reflected themes discussed with her pair. She occasionally also held meetings with the navigator to ask about his recollection of certain interview events when she had trouble remembering or wanted to co-reflect further. So although it is possible to conduct transcript analysis without both pairs, we recommend that either incremental analysis and interpretation are done during the interview process (see R9) or both interviewers participate in the analysis process (**R10**).

4.3 Benefits

The experiences of the pairs across all of the studies point to the myriad of benefits that pair-interviewing brings. In particular, the interviewers all noted that pair-interviewing reduced the stresses and strains of interviewing, specifically mentioning that pair-interviewing lessens the emotional burden (S1, S2, S4), improves engagement within the interview (S1, S3, S4), and allows for multiple perspectives in reflection and analysis (S2, S3, S4). As the driver from S1 remarked, *"two heads are better than one"*.

A major benefit of the pair-interview technique was that it provided emotional support and assurance to the interviewers. One interviewer from S4 noted that conducting interviews alone *"sound[ed] very scary"*, citing anxiety around talking to strangers, keeping track of their answers, and being able to respond appropriately. Conducting interviews with two people acted as an emotional safety net: comforting the interviewers that they alone were not responsible for the success of an interview. In S2, the driver reflected that she relied on the navigator to assure her that interviews had gone well, mentioning how she often felt intimidated interviewing participants that had more academic power and seniority than her.

In addition to the emotional stress of interviewing, all interview pairs mentioned their concern regarding the multitude of things to track throughout the interview — an awareness of time, understanding the participant's response, and engaging with appropriate follow-up questions. The driver and navigator role distributed the responsibilities across the pairs, giving each individual interviewer a seemingly more manageable set of responsibilities. Furthermore, we found that the distribution of responsibility also allowed the interviewers to feel more focused and engaged. Across multiple interview pairs, the bifurcation of the tasks freed up mental space for the driver to engage with what the participant was saying, leading to interviews that felt more like a conversation (S1, S2, S3). And in instances where there may have been technical or complicated responses, the navigator supported the the driver by responding or offering an appropriate response (S2, S3, S4).

After considering the benefits of pair-interviewing across the studies, we found that conducting a pair-interview distributed the logistical, conversational, and analysis responsibilities from one person to two, reducing the burden of a successful interview on any one researcher. We felt that there was a safety net with the presence of another researcher, which reduced the anxiety around inexperience with interviewing. Based on these experiences, we recommend the pair-interview technique when any of the following concerns are relevant to the interview process: the researcher is new to interviewing; the interview results require interpretation and reflective analysis; the participant's domain or the topic of the interview is complicated. Furthermore, given that pair-interviewing focuses on interviewer-to-interview relationships, we recommend pair-interviewing for most semi-structured contexts, and encourage others to experiment with it in conjunction with other visualization interview techniques.

5 Limitations

The recommendations presented in this paper were synthesized across four different research studies where the pair-interview technique was used and further refined. A major limitation of the paper is the sample size of reflections and that all teams were connected to one senior researcher. Given the hierarchical nature between the students and the senior researcher, the usage of the technique is largely influenced by this relationship. We see this as an opportunity for other researchers to further implement, test, and refine the technique.

6 Conclusion

Within visualization research interviewing is an important method to understand complex phenomenon, but it is also difficult to conduct. Based on our joint experiences across four visualization studies that made extensive use of semi-structured interviews, we found that pair-interviewing reduced the logistical, emotional, and interpretive burden of interviewing by redistributing the responsibilities across two interviewers. In this paper, we share a synthesis our experiences and provide a set of recommendations to enable other visualization researchers to similarly benefit from pair-interviewing in their research.

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