What is next for information world mapping? International and multidisciplinary approaches to understanding information behaviors/practice in context.

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Abstract

As the use of arts-involved and data visualization methods increases in information science, it is essential to reflect on the strengths and weaknesses of various methods. An international lineup of information researchers shares their experiences using the participatory, visual elicitation technique Information World Mapping (IWM) in their work. The authors begin with an overview of IWM, detailing its origins and emerging directions. They summarize their application of IWM to describe information behaviors/practices across various locations, cultures, disciplines, and technology access environments. The authors conclude by discussing key questions and areas of exploration for IWM in information research, including cultural influences, changes in media and methods for data collection, power dynamics, and researcher positionality and reflexivity. Insights offer new possibilities for the next phase of IWM in information research, including challenges and areas for innovation.

What is Next for Information World Mapping? International and Multidisciplinary Approaches to Understanding Information Behaviors/Practices in Context

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1. Introduction

Information world mapping (IWM) is an arts-based, participatory method that documents and triangulates contextual factors shaping people's everyday information behaviors/practices. Participants create visual maps of people, places, and things within their information worlds (Jaeger & Burnett, 2010). Benefits of IWM include its accessibility, flexibility, and extensibility. It proves advantageous for information researchers who prioritize participant agency and reject deficit framing (Greyson et al., 2017). Researchers have applied IWM on an international scale. Studies using the method have been published by researchers in Taiwan (e.g., Tsai, 2021), Canada (e.g., Greyson & Bettinger, 2017; Mabi, 2020), Scotland (Martzoukou & Burnett, 2018), and the United States (e.g., Kitzie et al., 2021) applying this method. Varying topics researched include family caregiving (e.g., Dalmer, 2017), LGBTQIA+ health information access (e.g., Kitzie et al., 2021), refugee resettlement (e.g., Martzoukou & Burnett, 2018), and student learning trajectories (Tsai et al., 2019) (Greyson et al., 2021). Diverse fields such as public health, education, aging studies, and information science situate these studies.

1.1 Problem statement

While IWM traces its roots to established methods and theories, including information horizons (Sonnenwald, 1999), Photovoice (Wang & Burris, 1997), relational mapping (Radford & Neke, 2000), and information worlds (Jaeger & Burnett, 2010), it is relatively new, developed by Greyson (2013, 2015) less than ten years ago. Research applying IWM offers insights into the method, including its adaptation within different contexts, its role in data collection, and the application of various analytic approaches to the maps. An international group of scholars addresses how to adapt this technique to multiple contexts explores challenges and new uses of IWM in information research, and offers future directions for research employing IWM.

The authors begin with an overview of IWM, detailing its origins and emerging directions. They describe their applications of IWM across various locations, cultures, disciplines, and technology access environments. The authors highlight IWM's benefits and challenges and provide their perspectives on opportunities and innovations for its use and adaptation. Overviewed projects examine the health information practices of parents in Canada (e.g., Greyson & Bettinger, 2017), health information practices of LGBTQIA+ communities in the American South (Kitzie et al., 2021); the role of information and identity for African immigrants seeking employment in Canada (Mabi, 2020); the information literacy wayfinding practices of Syrian refugees in Scotland (e.g., Martzoukou & Burnett, 2018); and the information practices of Taiwanese students (e.g., Tsai et al., 2019).

The authors conclude by discussing key questions and areas of exploration for IWM in information research, including cultural influences, changes in media and methods for data

collection, power dynamics, and researcher positionality and reflexivity. Insights offer new possibilities for the next phase of IWM in information research.

2. Overview of IWM

IWM grew out of Greyson's (2013, 2015) doctoral research with young parents (ages 15-24) in the lower mainland of British Columbia, Canada. Greyson sought an arts-involved method to complement traditional verbal elicitation techniques such as open-ended questions and critical incident technique (Flanagan, 1954; Urquhart et al., 2003) in individual interviews about young parents' information practices. Greyson wanted a method that would a) fit with an anti-oppressive and intersectional approach; b) be accessible to participants of varying age and maturity levels and with varying levels of literacy and English-language fluency; c) put some control of the data interpretation into participants' own hands; d) be portable and technologically low-barrier. After exploring Photovoice (Given et al., 2011; Julien et al., 2013; Wang & Burris, 1997), relational mapping (Radford & Neke, 2000), and information horizons (Sonnenwald & Wildemuth, 2001) as possible methods, Greyson decided to develop a new approach that would integrate elements of all three. This approach fitted with the project and study population and with a constructivist (Allen, 1994; Talja et al., 2005) and transformative (Mertens, 2007) paradigm.

IWM draws from constructivism in understanding people's everyday information behaviors/practices as qualified by social and cultural factors (Talja et al., 2005; Savolainen, 2007, 2008). Individual behaviors/practices like seeking "are not valuable in themselves; they become meaningful as tools that serve the furtherance of everyday projects of various kinds, both generic and specific" (Savolainen, 2008, p. 66). Both context – i.e., what has a lasting and predictable influence on information behavior/practices – and situation – i.e., part of a context – attach meaning to information behaviors/practices (Courtright, 2007).

The complexity and breadth of information behaviors/practices warrant methods that capture "the shape and meaning of information within everyday life" (Hicks & Lloyd, 2018, p. 50). Visual methods provide a promising yet underexplored avenue to elicit this context (Hicks & Lloyd, 2018). These methods range from drawing to photography to mapping. Mapping is complex and captures conceptual geographies or "theoretical containers in which information activities could take place" (Greyson et al., 2017, p. 150). Examples of conceptual geographies include information grounds (Pettigrew, 1999), information horizons (Sonnenwald & Wildemuth, 2001), information ecologies (Nardi & O'Day, 1999), and information worlds (Jaeger & Burnett, 2010). These geographies vary based on a) the tangibility of the geospatial metaphor (i.e., information grounds represent physical places while information worlds are abstract); b) information practices elicited (e.g., information horizons focus on seeking whereas information grounds examine sharing); and c) what they include (e.g., information ecologies

focus on people, practices, values, and technology, whereas information horizons focus on information seeking pathways and sources) (Greyson et al., 2017).

IWM envisions these geographies as complementary, and each informs the method's development. Information horizons is the most prescriptive due to its application as a data collection method; participants remember a specific time they needed information, often within a particular context, then draw their information-seeking experience focusing on sources consulted and in what order (Sonnenwald & Wildemuth, 2001). Per its constructivist roots, IWM extends the scope of information behaviors/practices elicited beyond seeking. It captures situations and contexts beyond sources consulted by focusing on people, practices, values, technologies, and places. IWM adopts the metaphor of information worlds as it is the "broadest and most commonly used across the conceptual geographies" (Greyson et al., 2017, p. 150) and "most inclusive and accessible to a diverse set of participants (p. 151).

A transformative paradigm contends that researchers must address power relations at each stage of the research process (Mertens, 2007). IWM adopts this paradigm by giving participants more interpretive control over data collection, asking them to depict and articulate their information worlds. Unlike Photovoice, IWM does not adopt participatory action research by involving participants in the study design (Brown, 2021; Greyson et al., 2017; Hicks & Lloyd, 2018). IWM is accessible to those with low literacy levels since it does not rely on writing and those who may have trouble with a lengthy interview or survey (Greyson et al., 2017). It captures sociocultural context, including institutions, power dynamics, and relationships that participants often cannot verbally articulate (Dalmer, 2017; McKenzie & Dalmer, 2020). Highlighting these invisible factors can lead to research findings advocating structural change. As a result of these participatory and agentic facets of its design, IWM is particularly advantageous for participants experiencing marginalization (Hicks & Lloyd, 2018).

Like information horizons, IWM is prescriptive because Greyson (2013, 2015; Greyson et al., 2017) provides a series of steps for completion and offers materials for researchers. However, Greyson noted that IWM could be adapted to fit different research contexts and needs and, with colleagues, has authored two works that overview particular adaptations (Greyson et al., 2017; Greyson et al., 2020). Adaptations include a) revising how IWM is conducted, such as combining IWM with other mapping techniques like information horizons (Dalmer, 2017; McKenzie & Dalmer, 2020); b) changing the data collection context such as by making IWM asynchronous and virtual (Tsai, 2021) or occurring during focus groups (Martzoukou & Burnett, 2018); c) incorporating new paradigmatic lenses, such as institutional ethnography, to inform collection and analysis of maps (Dalmer, 2017; McKenzie & Dalmer, 2020); d) extending IWM to non-vulnerable populations (Tsai et al., 2019); e) engaging in additional visual analysis techniques for maps, such as situational analysis (Greyson et al., 2020; Kitzie et al., 2021).

The authors are a group of international scholars who have used IWM and will describe how they situated the method in their research projects, followed by how it worked for their study populations. The authors then address approaches to analyzing IWM data, followed by future opportunities for IWM based on these observations.

3. Adaptations of IWM in information behavior/practice research

3.1 Mapping the health information practices of parents in British Columbia, Canada
Greyson used IWM in face-to-face individual interviews with young parents in British Columbia and vaccine hesitancy research with mothers of diverse ages. Typically, Greyson starts an interview with open-ended questions (e.g., questions about how a participant seeks, assesses, and uses health information), then invites participants to draw their information world map and talk the researcher through it. Following completion of the map, Greyson then asks a critical incident question (e.g., "Tell me about a time you needed health information for your child."), inviting a participant to talk the researcher through it with the map as a visual aid. Participants frequently reinforced and contradicted their previous verbal responses and maps when describing their "critical incident." This contradiction provided an opportunity for them to both modify their map as needed and discuss why that incident was different from their norm or why they may have portrayed something inaccurately as a norm (e.g., over-emphasizing reliance on a doctor as an expert information source because that is what one "should" do).

While Greyson initially anticipated that IWM would be highly accessible to participants who struggled with language or literacy, the researcher did not find this assumption universally true. Even the most earnest emancipatory ideologies and creative methods cannot always trump prevailing social dynamics. At times, it took a measure of reassurance to encourage a participant to give IWM a try. Prevailing social dynamics were especially so for participants who firmly felt they were not "artistic" and for those (e.g., heterosexual-identifying adolescent boys) who seemed to be struggling to enact ideals of hegemonic masculinity (Connell, 1995). Greyson assumes that the interviewer-participant dynamic may play strongly into the comfort of a hesitant participant in engaging with this arts-involved interview technique. Overall, however, both study populations who engaged in IWM have taken up the method in ways that are diverse, sometimes wildly creative, occasionally surprising, and puzzling to the researcher. One example of this is the "aspirational" map shown and discussed by Greyson and colleagues in their original methods paper (Greyson, O'Brien, & Shoveller, 2017), which was entirely non-textual and provided more of a metaphor for the participant's values and source authority assessments than a depiction of physical places and things.

Another example is shown in Figure 1 here, in which a mother of twins depicted a relatively typical information world map for her child vaccination decisions, showing information sources she deemed helpful (e.g., "Mum," "Partner," "Dad," and a drawing of a hospital) and unhelpful

"noise" (e.g., "Granola friends," people with "single babies," and "crap" on a computer screen), yet added in an element of change over time, which was not part of the IWM prompt for this study. According to this participant, over time information from her midwife (during pregnancy and early parenting), "trusted internet sources" (in her early parenting years), and her family doctor group (ongoing) contributed to building her experience as an intrinsic information and knowledge source. These IWM experiences have proven useful in Greyson's experience for triangulating data elicited through more traditional verbal-narrative interview question techniques.

[Insert Figure 1]

Initially, Greyson lacked confidence in their ability to analyze IWMs as artifacts themselves and resisted the idea of using the maps as anything beyond supportive documents in their analysis of interview transcripts and ethnographic field notes. The researcher felt exceptionally wary of misinterpreting participant intentions, which felt directly in opposition to the original goals for IWM. However, following repeated encouragement from mentors and anonymous peer-reviewers, Greyson began to explore methods for analyzing the maps that result from IWM (Greyson et al., 2020). As a result of this exploration, Greyson now endorses situational analysis as one method of fruitful and authentic – if time-consuming – analysis of IWMs, when done by the person who conducted the interviews and/or with the complete interview transcripts alongside to provide the necessary context.

Situational analysis supplements traditional constructivist analyses of social processes (most commonly, grounded theory) by capturing the complexities of context situating the research "individually, collectively, social organizationally and institutionally, temporally, geographically, materially, culturally, symbolically, visually, and discursively" (Clarke, 2003, p. 554). Put another way, situational analysis maps apply "thick descriptions" (Geertz, 1973) to the data analysis process by considering how these contextual elements shape the research situation of concern. Situational analysis involves making up to three maps (i.e., situational, social world, positional). These maps are text-based, abstract representations of key elements contextualizing the research and are informed by analytic work, most notably memo-ing. Research applying situational analysis to IWM has focused on creating situational maps that represent human, non-human, discursive, and other elements in the research situation and the relationships between them (Clarke, 2003, 2005; see also Greyson et al., 2020, Kitzie et al., 2021).

The initial use of IWM was as part of intake interviews within a longitudinal study. However, since the young parent study was a longitudinal, multi-site project, Greyson was able to experiment with training other researchers (including those without information science backgrounds) in using IWM with participants and using IWM repeatedly over time with participants. These experiments whetted the researcher's appetite to pursue future longitudinal

work, as participant review of how their maps had evolved –particularly across times of growth and life transition – seemed to hold a great deal of potential for both co-creating novel participant-interpreted data and for providing satisfyingly reflexive research experiences for participants as well as interviewers. A third study in which Greyson intended to use IWM had to be modified from face-to-face to remote fieldwork procedures due to the COVID-19 pandemic, and as a result, the researcher did not use IWM in that study. However, this experience has raised questions regarding whether and how IWM might be done remotely with participants, perhaps using an online drawing application or online videoconference technology and analog art supplies.

Key empirical findings from Greyson's (Greyson et al., 2017, 2020) work using IWM include:
- Maps elicited additional information sources, behaviors, and practices that may not emerge from a strictly verbal semi-structured interview. Examples include depictions of abstract concepts like faith as an information source and attention to embodied information.
- Mapping challenged the temporality of information worlds. Participants sometimes represented information worlds as not existing in the present but rather in the past or future or changing over time. An example included one participant mapping their aspirational information world and another depicting information sources contributing over time to developing her knowledge base that began to serve as an information source.
- Maps demonstrated how information world elements are context-dependent. For instance, an important person in one's information world could function as both a giver and receiver of information or a specific information source may be desirable for one topic but not another.

3.2 Using IWM to describe the health information practices of SC LGBTQIA+ communities
Kitzie's research team is currently using IWM to describe the health information practices of LGBTQIA+ people in South Carolina, focusing on community as the unit of observation (Kitzie et al., 2021). The team selected this method because of its accessibility for participants and ability to elicit in-depth information about the unique legal and sociopolitical challenges to engaging with information for health promotion experienced by participants (Movement Advancement Project, 2022).

Although community as a construct is fraught (Lingel & boyd, 2013), it plays a significant role in mediating the health information practices of LGBTQIA+ people (Veinot et al., 2013). When performing IWM, the researchers asked participants to envision their community's health information worlds. Centering community as the unit of observation led to an additional modification to remove critical incident questions following mapping. Pilot testers expressed that these questions made them feel as if the researchers were assessing them on how well their map described communal experiences. While the researchers began using IWM as part of individual,

semi-structured interviews, they incorporated the method into a focus group design. The researchers asked participants to prepare their maps and present them to the group, who could ask follow-up questions. The team was impacted by COVID-19 halfway through data collection, which led to conducting these focus groups virtually. Some participants created their maps using analog materials and then took pictures of them, whereas others made digital versions.

The team observed similar hesitancies expressed by some participants toward drawing as Greyson. The researchers explained this hesitation within the U.S. educational context of young children being initially encouraged to engage in artistic and visual expression; however, that encouragement wanes as they age (Barry, 2017). The team noted some facilitators for participants engaging in drawing, including:

- When doing in-person interviews, providing drawing materials that invoked nostalgia for a period when drawing was accepted (e.g., scented markers)
- Using humor to assuage concerns
- Letting participants prepare their drawings ahead of time
- Having participants share their drawings in a communal setting like a focus group provided a context of exchange for community-based support (e.g., complimenting each other's maps)

This latter facilitator also fostered resource and information sharing since participants noted helpful resources on their maps.

IWM highlighted the importance of visuals in communicating shared meaning centered on LGBTQIA+ identities and communities. Examples included popular symbolic imagery like a rainbow flag, logos of national and local organizations, and use of subversive imagery, such as a stick figure typically associated with being "male" wearing a skirt (Kitzie et al., 2021). Figure 2 displays one notable example in which focus group participant Ray uses an emoji of a person shrugging next to a label reading "Google," representing the popular search engine. This emoji conveys Ray's perception that Google's reliability when it comes to giving them answers to their health questions is questionable: "I end up just Googling stuff and hoping I'd get some type of answer from there because, as I mentioned before, I don't have insurance and so that's not always an option for me to go to a professional."

[Insert Figure 2]

Participants' use of subversive imagery identifies a more extensive finding that their maps captured larger power dynamics and relationships. Participants would use visual indicators like hierarchy and scale to illustrate complex concepts such as intersectional access to information or their source preferences from national to local resource types. The researchers determined it was appropriate to use situational analysis to identify these relational dynamics, which were present,

but invisible to participants (Clarke, 2005; Greyson et al., 2020). Paralleling Greyson et al.'s (2020) observation, this analysis was time-intensive; to illustrate, Kitzie's mapping memos, a foundational component to this analysis, produced 170 single-spaced pages, and the researcher only analyzed a subset of twenty-eight maps.

Based on Kitzie's experiences using IWM, future opportunities and areas for consideration include how faithful IWM needs to be to its original context to attain methodological insights. A further insight explores the unique insights IWM can contribute to describing the lived experiences of people and communities experiencing marginalization.

Key empirical findings from Kitzie's (Kitzie et al., 2021) work using IWM include:
- Participants viewed maps as tangible artifacts with value outside of the research process, such as envisioning them as resource guides for affirming LGBTQIA+ health information.
- Discursive power, or knowledge and practices considered within a society, shapes how participants visually constructed their maps, including their abstract representation of absence, use of scale and position to denote the hierarchy of information source importance, and use of symbols like a dollar sign or red hats emblematic of Donald Trump supporters to identify structural and systemic inequalities.
- Participants engaged in resistance against discursive power shaping their information worlds using non-textual imagery. Examples include remediating widely understood symbols to represent new ideas, such as drawing a stick figure traditionally male-coded as wearing a skirt and expressing abstract concepts like hope to represent idealized information worlds.

3.3 Mapping the employment information practices of African immigrants
Mabi employed IWM in a study that explored the role of information and identity for Black African immigrants seeking employment in Canada's Metro Vancouver (Mabi, 2020). Guided by Britz's (2004) information poverty framework and Crenshaw's (1990) concept of intersectionality, the study collected data through environmental scanning, document analysis, and semi-structured interviews incorporating IWM. The semi-structured interviews commenced with IWM, which lasted about 15 minutes. IWM served as an ice breaker, provided participants with an additional means to share their experiences, deepened understanding of interview responses and other data collected, and provided prompts to engage participants further.

Participants were given flip chart sheets and colored markers and invited to represent their employment information worlds in response to a prompt:

- Recall a time that you were looking for a job in Canada. Can you represent yourself and what you did?

If participants appeared to need additional direction, Mabi presented them with additional prompts such as:

- Who did you talk to? Where did you go? Did you encounter any challenges?

The IWM session was a segue into the main interview, and Mabi began with different interview questions depending on how the explanation of the diagram went. If, for example, a participant addressed one of the interview questions while explaining the map, Mabi skipped to the appropriate interview question to continue the conversation. Altering the order of the questions as needed ensured a smooth interview process and allowed participants to finish a train of thought without interruption.

As with all parts of the interview, IWM was an optional activity. Mabi invited twenty-five Black African immigrants to participate in IWM. While sixteen participants engaged in the mapping, nine opted not to participate. Although Mabi did not specifically inquire from participants why they declined, the researcher observed a general lack of enthusiasm for diagrammatic representations, limited understanding of, and unfamiliarity with, the method.

In addition, participants fared better when presented with concrete prompts than when asked open-ended questions. With open-ended questions, participants tended to write lengthy responses or come up with no answers until Mabi offered more streamlined prompts. All sixteen participants were unfamiliar with the method and required examples and assistance to complete the mapping. Although it is not recommended to provide research participants with samples of information world maps so that they do not feel pressured into drawing their maps in a certain way, Mabi discovered during the pilot interviews the need to provide examples to help participants understand the method. Mabi offered several examples from the literature and a mock map drawn for this purpose.

Mabi used qualitative content analysis to summarize the maps (Greyson et al., 2020). In doing so, the researcher audio-recorded participants' descriptions of their maps with their consent. Mabi transcribed the audio recording into text and coded and analyzed these along with the interview data, following Creswell's (2014) approach to qualitative content analysis. Mabi related the IWM results to data from the interviews to triangulate and give more meaning to the interviews.

This research is the first known application of the IWM technique with African immigrants living in Canada who are not international students. It was also all participants' first time engaging with IWM. Employing IWM with this population offered insights into the possible influence of culture and gender roles on the method. Participants demonstrated a clear preference

for verbal conversations over drawing. Communication preferences differ from one country or culture to another, with some cultures preferring verbal communication to written or diagrammatic communication. Female participants with dependents also tended to multitask while completing the maps, such as performing child and home care duties. Thus, Mabi ponders the following questions when employing the IWM method: Why might people engage in or opt not to participate in information world mapping? What aspects of people's culture could influence IWM? Is there a possible impact of multitasking on the quality of the maps?

Key empirical findings from Mabi's (2020) work using IWM include:

- Maps depicted power imbalances experienced by participants, such as a list of multiple barriers experienced when seeking employment. In Figure 3, IWM participant Oorloochy describes the barriers she encountered in her employment search. Oorloochy used her IWM barrier list as a reference for further discussion.
- Participants denoted on maps a multivalence of information sources consulted based on their needs.
- Maps exhibited a process-based orientation to information worlds, such as the interdependence of certain events occurring in a given order or participants to secure employment.

[Insert Figure 3]

3.4 Syrian New Scots' mapping across language barriers
The aim of the "Syrian new Scots' Information Literacy Way-finding practices" research project was to explore the information needs of 'Syrian new Scots' (the preferred name for Syrian refugees in Scotland), their habitual and adaptive information literacy practices, and the barriers and enablers they encountered within their new sociocultural settings, via their interactions with people, tools, and processes (Martzoukou & Burnett, 2018). Martzoukou and Burnett collected primary data via interviews with three Local Authority Leads for Syrian Resettlement and focus groups with Syrian new Scots in three geographical locations in Scotland: two rural areas and one urban.

At the beginning of the focus groups, Syrian New Scots participated in a drawing exercise that helped elaborate on their main needs for information, following IWM (Greyson, 2013; Greyson et al., 2017). That exercise enabled creative communication about the participants' information worlds and their experiences around seeking, receiving, and communicating information. Martzoukou and Burnett asked participants to reflect upon their primary personal and family information needs experienced in their daily life. The researcher then asked participants to visualize one or two key incidents/problems they had experienced, how these were resolved, and the barriers and enablers they encountered. Dervin (1976) developed a taxonomy of exploring

information needs based on describing specific problems to articulate information needs, which informed this approach.

Key questions included the following:
- Can you draw yourself trying to resolve these needs?
- Can you draw in the people and places and things in your life that provided useful information to you?
- Can you draw those that created difficulties?

Further prompts followed those originated in Greyson (2013, 2015; Greyson et al., 2017), which were rooted in information horizons (Sonnenwald & Wildemuth, 2001).

Martzoukou found IWM to be a visual participatory, interactive drawing-based interview technique, which enabled a richer exploration of information behavior in context. It was particularly useful with participants as most did not speak English. The questions were communicated in Arabic with the help of an interpreter, and the technique helped to elucidate critical incidents around the information world of Syrian new Scots. Via their drawings, they expressed different needs, such as the need to learn English fast, connect with families, and address everyday life communication barriers. Participants attempted to visualize situations they encountered and, interestingly, even attempted to add English explanations where they could or proactively sought the interpreter's help, especially when they wished to express gratitude for the local communities which had embraced and supported them. In that way, IWM acted as a research tool, an ice-breaker activity, and a way to express predominant feelings and emotional states.

IWM was an effective visual communication method to express what could not be easily articulated within the social environment that participants experienced, acting as a prompt to stimulate participant engagement and interaction and as a device to contextualize and enrich the stories shared by the participants.

Participants' drawings acted as stimuli for discussing everyday life problems/ information needs, information sources and enablers/barriers, communication and sharing of information, and cultural integration. They also provided direct and unobtrusive communication between the researcher and the interviewees. Although the researcher did not intend for the drawings to supplement and triangulate information from the focus group interviews (as the researcher did not systematically analyze the visual content), they helped bridge the communication divide created by the interpretation process during the interviews. The drawings themselves also required little interpretation since participants used visual accessible language commonly understood by both parties without any cultural barriers (e.g., a person crying conveyed sadness, family members drawn together holding hands conveyed family ties, and language barriers were depicted in the

form of a wall), which aided understanding and illustration of issues, eliciting different perspectives, situations, experiences, and views authentically as well as conveying humility. For example, one of the most critical issues that all participants highlighted, notably the female respondents, was their separation from family members. Most participants had extended families, but many of their children, their parents and siblings were located in different countries (some in Syria but others in Lebanon and Egypt), and in some cases, they had not seen them for years. One of the female participants' drawings (Figure 4) represented the bitter separation many of the families had to endure, depicting her parents and her siblings, her father who was ill, and one of her sisters who had a new baby back in Syria. She had not seen them for some time and had tried to communicate with them online, but the network in Syria was unreliable, which meant that contact was not usually possible.

[Insert Figure 4]

In this study, Martzoukou used the drawings as a visual participatory method to elucidate the information-related experiences of Syrian refugees. The drawings played a meaningful role as a stimulus for further conversations. Participants expressed much more than their information-related domains via their drawings, incorporating affective situations, which offered richer insight into their experiences. At the same time, however, there was a perceived 'lack of control' around the direction of the drawings, which depicted a whole spectrum of vulnerable and complex situations and experiences, not all of which were directly mapped to the immediate purposes of the study. Future use of the IWM technique should consider this perceived 'lack of control' around the direction of the drawings and the complexity of their latent meaning, should drawings become the object of primary data collection or a supplementary data collection method.

Key empirical findings from Martzoukou's (Martzoukou & Burnett, 2018) work using IWM include:
- Maps showcased vignettes from participants' experiences with affective and sensory cues, such as a bus screeching to a stop or someone crying. These vignettes often illustrated concerns and challenges they had experienced or were currently experiencing.
- Participants leveraged maps to bridge communication barriers with researchers by using widely identifiable symbols and visuals.
- Maps functioned as tangible artifacts for participants outside the research process, including facilitating advocacy and policy-based efforts.

3.5 Applying IWM in academic, health, and everyday-life contexts
Tsai has applied IWM in academic, health, and everyday-life contexts. Tsai et al. (2019), Tsai and Huang (2020), and Tsai (2021) used IWM in academic settings. While Tsai et al. (2019) traced master's students' thesis writing processes semester by semester since students entered the

program, Tsai and Huang (2020) explored the collaborative information practices of domestic and international students in coursework contexts. Tsai (2021) also conducted IWM with college students with Autism Spectrum Disorder (ASD) and in coursework contexts. For health contexts, Tai and Tsai (2021) recruited caregivers of ASD children and used IWM to examine caregivers' information behavior while caring for their ASD child. Finally, in everyday-life contexts, Tsai and Wu (2019) examined the everyday-life information practices of Taiwanese international students in Japan. In all works, data collection started by asking participants to recall and describe their experiences or a specific incident, followed by the participants' IWM drawing with follow-up questions that helped clarify specific details.

Except for Tsai (2021), where the researcher accommodated ASD students' preferences on interview mode, other studies occurred in face-to-face settings, and the researcher provided the same 12-color pens and blank A4 paper for the participant to draw their IWM. In Tsai (2021), the researcher experimented with various modes of data collection, including an online synchronous interview and an online asynchronous interview through email. The researcher also paid extra attention to maintaining more personal space and time for the participants who met in person.

Almost all participants were pursuing or had a higher education degree and were living in a large city in Taiwan or Japan. Except for the caregivers recruited from Tai and Tsai (2021), who were aged between 37 and 50, participants in other studies were either undergraduate or graduate students typically in their early twenties. The only vulnerable group of participants was ASD students in Tsai (2021). IWM data collection went well even if almost all participants chose not to think aloud, and many participants had an initial reaction saying they did not know how to draw. After a few minutes, participants typically did it well. Prompting with earlier conversation in the interview and breaking down instructions in detail using a storyboard may help facilitate the process.

While the IWM procedure went well, participants may exhibit different characteristics and preferences for drawing their IWMs. The time needed, the number of colors used, and the drawing style varies largely among participants. Some contemplated at least 10-15 minutes before drawing while others finished within 10-15 minutes; some preferred using a single color while others utilized almost all 12 colors provided; some depicted their IWMs using a metaphor while others included specific items to present information sources. Quite a few participants relied on using text and links in their IWMs. Nevertheless, IWM no doubt helps solicit and capture a thorough picture of information behaviors/practices. For example, Figure 5 displays a graduate student's information practices when completing his final project. The brain positioned in the center with arrows linking information sources reflects how the participant transformed information derived from various sources with his thoughts. Within the brain, the student used tools icons and an easel to imply how he organized information logically and creatively. The

texts and arrows indicated specific types of information that fulfilled his particular information needs, and the arrows also indicated how he interacted with different information sources in the information world. And he further highlighted the successful outcome using a yellow star on one corner of his presentation slides on the far right of his brain. Through the IWM drawing and debriefing, the participant engaged further and identified the most important elements in his information world.

[Insert Figure 5]

As suggested by Greyson et al. (2020), all works used situational analysis and/or qualitative content analysis. Data analysis started from open coding and moved on to different focuses. For instance, Tsai et al. (2019) focused on the items, places, and relationships that changed in different phases of the thesis-writing process. Tsai and Huang (2020) and Tsai (2021) examined the items, places, and relationships in students' collaboration. Tsai and Wu (2019) described what helped international students adapt to the new environment.

The unit of observation is the individual for all works. Although the researchers once debated the possibilities of using "event" as the unit of observation, it is challenging to solicit specific events with clear boundaries. Even if the researchers used the critical incident technique in the interviews, participants tended to express the general situation in their drawings. It could be difficult to differentiate the sub-contexts in the IWMs if only relying on their drawings. Therefore, it is very important to consolidate the data derived in both verbal narratives and drawings.

Based on the previous experiences using IWM and taking a step forward, Tsai's ongoing projects conducted IWM through online synchronous interviews during the pandemic. Another variation used in pedagogical contexts is transforming the IWM interview into an asynchronous take-home exercise in an information behavior course.

Key empirical findings from Tsai's (Tai & Tsai, 2021; Tsai et al., 2019; Tsai & Huang, 2020; Tsai & Wu, 2019; Tsai, 2021) work using IWM include:
- Maps captured social processes, including referral networks, by denoting the relationships between people, items, and places, and the order that these relationships occur, such as by starting with people, then going between physical and virtual locations, before finally obtaining referrals.
- Maps denoted how participants' worldviews shifted over time, which in turn shaped their information behaviors/practices. For instance, findings denote that participants who were master's students developing their thesis topics experienced isolation in their second years, which in turn limited reciprocal behaviors/practices like information exchange.

- Although participant maps might visually appear similar in composition, situational analysis provided a valuable lens from which to uncover thematic differences.

4. Discussion: Major findings, challenges, and recommendations for IWM

Major findings from the reviewed projects suggest that IWM opens possibilities for a broader range of information behavior/practice research. The method elicited additional contextual factors, including:

- A process orientation that shows how information behaviors/practices occur and in what order
- Affect and sensorial elements highlight participant vignettes and experiences, such as how something felt, looked, sounded, etc.
- Temporalities that represented not only the present but also the past, future, and aspired
- Power and how it both shapes information worlds and is resisted by participants

Additionally, IWM elicits additional contextual elements via its transformative paradigm, which cedes some control of the research process from researchers to participants. This effort to even out researcher-participant power dynamics translates into participants not always doing what the researcher would expect, such as refusing to draw or making a drawing that does not seem to relate to the prompt. Such a lack of control presents a critical opportunity for data collection to elicit contextual elements of participants' lived realities, bolstering IWM's constructivist paradigm. For instance, Tsai initially observed that when studying the information worlds of first-time homebuyers, some of the maps they drew appeared to be off-topic. However, when analyzing the maps, Tsai found that they provided more contextual elements for the project. Mabi observed that ceding control meant accommodating participants' (generally women's) multitasking, as they performed culturally expected roles in the home such as childcare. Seeing this multitasking occur added additional context to the research, enriching the data collected (Greyson et al., 2021).

Another major finding related to IWM producing material artifacts with uses beyond data collection and analysis. These uses include bridging communication barriers between participants and researchers, using the maps as community-generated information resources, and using the maps for advocacy-based purposes.

Greyson noted the potential for using maps as a reflective device for participants in longitudinal work. After the initial data collection process, maps may serve as information resources for participants' communities. For instance, Kitzie's virtual focus group participants took notes and shared links related to information and resources on their maps in the chat. This observation suggests the potential for IWM to foster resource sharing and support, particularly among underserved communities.

There is also potential for IWM to communicate social advocacy messages to stakeholders, such as policymakers. For instance, Martzoukou observed global messages in Syrian New Scots' maps, such as the use of the sun to symbolize hope. Martzoukou posited that these messages signified participants' efforts to effectively get their message across and increase societal awareness of their lived experiences (Greyson et al., 2021).

These major findings contribute to the IWM literature by identifying and further describing additional advantages of using the method beyond those initially identified by Greyson et al. (2017, 2021). The authors' various applications of IWM also identified several potential challenges. These challenges spanned the accessibility of the method to participants, analysis of maps, and balancing researcher and participant control over map interpretation. The authors now address each challenge and provide recommendations based on their experience applying the method.

Concerning participant accessibility, Greyson created IWM for use with marginalized populations because of its low barriers to accessibility for participants with low literacy. However, the authors' experiences suggest that in some cases, this activity might instead make participants feel uncomfortable or talked down to depending on their cultural context or responses. Based on being an insider within the community studied, Mabi considered their shared preschool and elementary education background that did not focus on drawing but instead on writing. As a result, Mabi made the activity optional. Mabi observed that participants who said yes to drawing were curious to try something new and trusted Mabi as a researcher; Martzoukou and Tsai also noted the importance of participant trust in mapping since many perceive drawing as a vulnerable activity.

These observations denote the importance of researchers carefully considering how their positionalities and larger social and cultural contexts may shape the mapping process. Ways to assess potential adaptations of IWM across the participatory research spectrum include pilot testing, reflexive journaling, and, critically, cultural humility relative to the participants under study. For instance, Kitzie's research team, sensitized by their lived experiences as queer people with backgrounds in queer theory, found that IWM was advantageous in eliciting collective communal meaning through shared visual representations of local and national LGBTQIA+ colors and symbols.

Final considerations concerning participant accessibility of IWM involve when IWM occurs and how researchers use maps outside the initial data collection process. Tsai identified a potential way to assuage participant anxiety related to drawing by asking participants to draw the maps after the major conversation ends in the interview. Another strategy may be to give participant map examples and storyboards.

Concerning analysis of the maps, the authors identified situational analysis as a fruitful method for interpreting these contextual elements, which are difficult for participants to articulate verbally. However, situational analysis cedes control back to researchers in interpreting the maps' meanings; further, as Greyson and Kitzie noted, the method takes considerable time and effort. When considering using situational analysis to interpret participant maps, researchers should consider project scope and intended outcomes for IWM. If the intended outcome is to triangulate interview data, open qualitative coding of participants' map descriptions may suffice. However, suppose the project is more interpretive and seeks to understand the roles of context in mediating information behaviors/practices. In that case, situational analysis may be a valuable way to gather new insights by looking at the data from different perspectives and constantly asking new questions. In either case, all researchers observed that viewing the maps in conversation with the interview data was more productive, even when performing situational analysis (Greyson et al., 2021).

The final challenge across all projects was balancing researcher and participant control over data interpretation. The overviewed research varied in balancing control between participants and researchers across the additional dimensions, including:
1. Whether IWM was mandatory or optional,
2. How structured the mapping activity description was versus how much the description left interpretation up to participants,
3. The specificity of questioning about the map,
4. The degree to which participant interpretations guided data analysis.

An approach that worked for one research population, context, and unit of observation might be inappropriate for another; for instance, critical incident questioning appeared to focus some participant mapping activities while making other participants feel that the researcher was testing them.

This observation suggests that there is no "right" way to engage in IWM and that the degree of participant control within participatory research exists on a spectrum. Further, more participant control does not necessarily equate with a "better" study, especially if increased control threatens participant wellbeing (Brown, 2021). For instance, if Mabi made IWM mandatory for participants, it may have led to them experiencing adverse affective reactions like frustration or even threatened their ability to complete basic activities like childcare as they multitasked during data collection.

These insights into IWM suggest a few things. First, like any method with participatory elements, IWM is not a panacea for rectifying researcher-participant power imbalances. Researchers must engage in critical, reflexive strategies to anticipate potential harms and promote participant wellbeing that exceeds the use of one creative method. Second, IWM can

and should be adaptable, particularly in considering the cultural and communal contexts of participants' lived realities. This adaptability results from IWM's constructivist orientations, prioritizing context and situation in qualifying people's information behaviors/practices. Capturing people's lived realities, in this case, these behaviors/practices, is a "messy" process (Dervin, 1999). Adaptations include the degree of structure to the mapping activity, data analysis techniques, and when and how IWM and the resultant drawings are used. Therefore, while the authors' insights in using IWM do not provide a singular solution or way forward, they offer new possibilities for the next phase of IWM in information research, including challenges and areas for innovation.

5. Conclusion

IWM is an emergent, participatory visual elicitation method coined in Greyson (2013, 2015). The authors represent an international group of researchers who have used this innovative method to investigate information behaviors/practices across cultures, disciplines, and technology access environments. Findings highlight a crucial advantage of IWM for information behavior/practice research: the method elicits additional contextual elements – including process, affective and sensorial elements, temporality, and power – not as well-identified using other qualitative methods like direct questioning. Further, IWM has potential uses beyond solely serving as a method, including bridging communication barriers between participants and researchers and using the maps as community-generated information resources and for advocacy-based purposes. However, the authors also experienced specific challenges when applying IWM, suggesting several potential weaknesses, including lack of accessibility for individuals and groups, loss of control related to how much the researcher can direct what maps address, and that analysis of maps may be time-consuming if researchers use methods like situational analysis.

These insights suggest that those situating their work within the constructivist tenants of information behavior/practice research consider using IWM. Based on the research design, researchers may use IWM to triangulate other methods or as a standalone one. Researchers should remember that there is no "right" way to conduct IWM research. Instead, insights from the authors suggest that IWM is adaptable based on populations studied, the amount of interpretive control the researcher wishes to keep (and that is appropriate in building trust with participants and avoiding potential harm), and analytic methods used. This flexibility allows researchers to delve better into participants' lived experiences and deepen their understanding of the phenomena under study. The authors expect IWM to continue to evolve and contribute to future information behavior/practice research.

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