Asymmetry in Media Spaces

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ABSTRACT
In any collaborative system, there are symmetries and asymmetries present in both the design of the technology and in the ways that technology is appropriated. In typical CSCW research and development, however, there seems to be more focus on supporting and fostering the symmetries than the asymmetries. Throughout more than 20 years of media space research, for example, there has been a recurrent theme—researchers pursuing increased symmetry, whether achieved through technical or social means. The research literature on the use of contemporary awareness systems, in contrast, displays little if any of this emphasis on symmetrical use; indeed, this body of research occasionally highlights the perceived value of asymmetry. In this paper, we unpack the different forms of asymmetry present in both media spaces and contemporary awareness systems. We argue that just as asymmetry has been demonstrated to have value in contemporary awareness systems, so might asymmetry have value in CSCW research system development, as well. To illustrate, we present a media space that emphasizes and embodies multiple forms of asymmetry and does so in response to the unique needs of a particular work context.

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INTRODUCTION
In any collaborative system, there are both symmetries and asymmetries present in the design of the technology and in the ways that technology is appropriated. The telephone, for example, supports audio symmetry—a person on one end of the connection can hear everything at the other end and vice versa, in equivalent fidelity. Yet with traditional telephone technologies, there is an asymmetry of knowledge about who is on the other end of the "line." While the person who initiates the call knows whom she is calling, the person being called does not know who is calling him and yet he is still expected to answer the phone. Social convention helps to mitigate this asymmetry of knowledge; the person who initiates the call is expected to immediately identify herself (e.g., "Hi, this is Diane"). Recent technological innovations such as caller ID and customizable ring tones have also attempted to mitigate this asymmetry.

In Wikipedia, as another example, the transparency of work in the authoring process is symmetrical: any one individual editing an article can see the edits that any other individual has made and vice versa. Yet the initial perceived value of that editing work is not always symmetrical; edits from anonymous users are considered to be "inherently suspect so new users are encouraged to register and get user names" [5]. There is additional asymmetry in the distribution of work on Wikipedia, where less than 10% of the authors are responsible for more than 90% of contributions [30].

Both symmetries and asymmetries are clearly present and valuable in collaborative systems. Typical CSCW research, however, tends to focus on supporting and fostering symmetries. Asymmetries are frequently either overlooked in the research literature or considered a design challenge that must be addressed. Research in real-time shared editors, for example, focused on developing platforms for collaborative writing that enabled a synchronous symmetry of use, allowing all users, simultaneously, the ability to both browse and edit documents (e.g., [29]). Stefik et al. coined the acronym WYSIWIS ("What you see is what I see") to describe the predominant form of symmetry engaged by the research community in this domain, a symmetry of content and media [36][1]. More recently, the design and development of novel, collaborative technologies for domestic contexts has also foregrounded symmetry in design. Plaisant et al.'s shared calendar system, for example, was explicitly designed to foster symmetrical awareness of family schedules across multiple generations of users [31]. Clearly, symmetry can be a desirable thing in system design, supporting more tight-knit collaboration among colleagues in the workplace or increased empowerment for elders in multigenerational interactions.

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[1]While some notable research has considered the asymmetries of roles in collaborative authoring (e.g., [22]), this research represents the exception rather than the rule.

In this paper, we argue that the asymmetries of collaborative technology deserve more attention in CSCW research development. More generally, we caution against implicit assumptions that symmetry should always be the end goal of design.

Nowhere, perhaps, is the dialogue about symmetry and asymmetry more explicit than in the media space literature. As such, we ground our discussion of asymmetry in this genre of CSCW technology. We begin, then, by unpacking the many asymmetries present in media space systems (albeit often implicitly) and discussing related design efforts to mitigate these asymmetries and to support more symmetry in system use. By way of contrast, we then unpack the many asymmetries present in the use of contemporary awareness systems. Here, we highlight empirical findings that describe the perceived value of these asymmetries. Finally, we present one example of a media space designed to embody and foreground many different, often overlooked, and sometimes highly valued asymmetries.

ASYMMETRIES OF MEDIA SPACES

Throughout more than 20 years of media space research, there has existed a tension between the asymmetries intrinsic to media spaces and the desire for some degree of symmetry in how these systems are used.

Gaver argues most explicitly that media spaces are an inherently asymmetrical technology: in face-to-face contexts, it is most commonly the case that if one party can see another, then the reverse is also true, but this is not inherently the case in media spaces, which afford…

> …one-way viewing and listening to a far greater degree. In the everyday medium, to obtain visual information is usually to make information available; in media spaces, making information available is an independent act from obtaining it [12].

Within media spaces, then, it is possible to unobtrusively "glance" into a colleague's office via a video link to assess whether it would be a convenient time to talk. But it is also possible to spy on a colleague, watching her video link over time without her being aware that she is being watched.

Mitigating this fundamentally asymmetrical nature of media spaces has been a constant refrain throughout research on media spaces, where designers and users (often designers-cum-users) work to facilitate some degree of symmetry in the use of these systems. Most commonly, this engagement has manifested itself in the negotiation and re-negotiation of audiovisual reciprocity (e.g., "if I can see you, then you can see me" or "I agree to let you 'glance' in on me if you agree to let me 'glance' in on you"), and in debates over whether this reciprocity ought to be sought through social and/or technical means.

The particular research dialogue about reciprocity in media spaces actually reflects multiple forms of asymmetries—an asymmetry of media and an asymmetry of engagement, for example. Here, we distill and unpack some of the different forms of asymmetry present in media space systems: asymmetries of media, fidelity, participation, engagement, benefit and place.

Asymmetry of Media

The different kinds of content that individuals may share through media spaces create one kind of asymmetry—an asymmetry of media. The asymmetry of media is the most commonly discussed type of asymmetry in the media space literature. Researchers strove to achieve a symmetrical "reciprocity" in media use, where one individual reflected *in kind* the type of content that another individual shared: audio for audio and video for video. Violations of expectations about media symmetry were considered socially inappropriate. For example, when one media space participant was discovered to have "disconnected his camera in order to see others without being seen, this behavior was noted and censured by others in the community" [8].

Researchers aimed to mitigate the asymmetry of media through both technical and social means. The Cruiser media space, for example, had an explicit and enforced technical "reciprocity rule"—one could not glance into another's video feed without being seen as well [33]. Technically enforced reciprocity was viewed as supporting social symmetry, grace, and privacy:

> These design decisions are based on a philosophy of social symmetry derived from observations of everyday office life. In the real world, it is generally not possible to see without being seen. By preserving this characteristic of the physical world, we incorporate a certain social grace into computer-mediated interactions and provide an element of social privacy by ensuring that one cannot be observed surreptitiously [33].

Further efforts to ensure greater visual symmetry resulted in experiments with video tunnels, in which cameras and displays were configured so as to make it almost impossible to see the distant video feed on screen without being captured by the camera [35].

The asymmetry of media in media spaces is further highlighted by the extent that media has been found to serve as a form of social currency. When media use is not symmetrical, studies have shown that individuals with "lesser forms of presence information" (e.g., static images in lieu of video) were neglected by other participants and felt, themselves, like "2nd class citizens" [32].

Asymmetry of Fidelity

The different amount of detail provided in media spaces creates an asymmetry of fidelity. Asymmetries of fidelity may be caused by inherent asymmetries in the fidelity of different media (e.g. static vs. dynamic images or variances in video quality, frame rate and resolution) or by personal preferences about how that media is (or is not) transmitted to others and displayed.

Media space research explicitly engaged with the asymmetry of fidelity by exploring the effects of blurred video as a safeguard to privacy while still providing awareness information (e.g., [18], [27]). In addition, studies of the use of media spaces report participants 'adjusting' video fidelity by manually covering their video cameras, or turning their cameras around for periods of time (e.g., [2], [27]).

Asymmetry of Participation

The varying degrees of participation in communities surrounding the media space also create a form of asymmetry. In the PARC media space, only a subset of researchers owned end nodes, each explicitly asking to join in [2]. The act of "signing up," as Dourish argued, was an implicit "acceptance of the social practices and norms which govern[ed] acceptable media space use" for that community [9]. Individuals who owned end nodes and were at the center of the media space community were recognized as participants of the media space. Individuals who did not own an end node but were still peripheral or even accidental participants in the media space community were generally not discussed in early media space research[2].

More recent media space research has provided more concrete evidence that individuals who do not own their own media space nodes can also be participants in the media space, whether that participation is intentional or not. A study of the Notification Collage, for example, reported an instance in which an individual participated in the media space without even knowing that the system existed:

> One telecommuter reported seeing the lights come on after hours in the laboratory and watching a cleaning person (unaware that she was being monitored) going about her duties [15].

This account of media space use challenges any naïve assumptions about what it means to participate in a media space, more clearly disentangling varying degrees of participation from the ownership of a node.

Asymmetry of Engagement

The breadth of attention and focus one may have with media spaces also suggests an asymmetry of engagement. Media spaces support a breadth of practices across a continuum of levels of engagement, from peripheral awareness to more focused interactions [2].

The asymmetry of engagement was also engaged explicitly in research through efforts to support socially negotiated, symmetrical use. The RAVE media space, for example, allowed individual users to customize rules for media space interactions based around predefined services (e.g., a short, one-way video connection glance; a temporary, specifically-requested, two-way audiovisual connection videophone; an open-ended, long-term audio/video connection office-share, etc…) [9]. While the rules enabled agent-based, technical mediation of system asymmetry, the symmetry in the system was negotiated within the social sphere as individuals with media space nodes had to both agree to a particular scope of engagement before it would be supported by the system.

Asymmetry of Benefit

The varying degrees to which participants benefit from media spaces also create a form of asymmetry that is not typically discussed in the media space literature. We know that a collaborative technology "never provides the same benefit to every group member" [16]; media spaces are no different.

One cross-cultural installation of a document-based media space uncovered an asymmetry of benefit, caused at least in part by the inability of the media to "transcend social boundaries" [6]. This asymmetry of benefit drove participants at one of the sites to sever the network connection and re-engineer their own local version of the media space.

Research has also shown that communication patterns vary according to work relationships; more communication, for example, travels down the organizational hierarchy than in the reverse direction [17]. Although many media spaces were used primarily by close work colleagues within a relatively flat organizational hierarchy (e.g., [28]), other media spaces were used across multiple levels of organizational hierarchies (e.g., [9], [15]). One might speculate, then, that there was an asymmetry of benefit of media spaces among individuals at different locations within this hierarchy.

Asymmetry of Place

The varying cultural norms surrounding the use of systems in different contexts also create asymmetry. Early media space research often focused on the use of systems among symmetrical physical places: office-to-office or common area-to-common area. The asymmetry of place was more prominent in research that extended its focus to address the differential use of media spaces between office nodes and shared common areas (e.g., [2]). More recently, the asymmetry of place has been engaged in research that explores the differential use of media space systems both to connect home and office environments [27] as well as to connect cross-cultural office environments [6].

In summary, media spaces are an intrinsically asymmetrical medium and numerous forms of asymmetries exist in both their design and use. Much development work in media space research has focused on mitigating these asymmetries, which often seem to be perceived as design challenges to be overcome. We question the assumption that asymmetries in sociotechnical systems should consistently be mitigated and present a counterargument about the potential value of asymmetries from the domain of contemporary awareness systems.

[2] There are occasional references in the media space literature to a "guest" being introduced to others over the video/audio channel, but the guests' experiences of the system were not considered part of the research foci.

ASYMMETRIES OF AWARENESS SYSTEMS

Looking to awareness systems—particularly, commercial systems that have been widely adopted and appropriated for awareness purposes—helps to shed light on the perceived value of asymmetry by users. In this section, we draw from the following classes of technologies:

- **Instant messaging** has been appropriated in numerous ways to provide awareness information. Instant messaging exchanges, themselves, have been appropriated as a way of maintaining a "sense of connection with others within an active communication zone" [24]. Users also monitored instant messaging buddy lists to create a sense of connection. In addition, instant messaging display names and status messages have been appropriated for providing updates of "momentary happenings" such as one's current mood, location or activity [34].
- **Blogging** is a "means of relating [one's] life to others by telling [one's] continuing story in close to 'real time'" [25]. These continuing stories were often motivated by a desire to update an audience with awareness information such as one's "activities and whereabouts." The activity of blogging also resonates with the often spatial- and community-oriented nature of awareness systems; in studies, "bloggers reached out to connect with and insert themselves into the social space of others in their personal social networks."
- **Microblogging** is a more terse and volatile form of blogging in which the most common posts present awareness information such as an individual's "daily routine or what people are currently doing" [19]. Similar to that of blogging, the goal of microblogging seems to be to "enhance one's cyberspace presence, an elusive concept that seems to refer to being 'out there' (wherever 'there' is) as much as possible" [23].
- **Social Networking Sites** such as Facebook[3] and Friendster[4] allow users to create profiles and links to others' profiles (presumably within social networks). These user-defined profiles have been found to enable the peripheral awareness of individuals' offline social networks [20]. Rather than being a static entity, a social networking profile may also be considered a more dynamic mechanism in support of awareness—"a communicative body in conversation" [3].

These technologies, while perhaps not primarily built to serve as awareness systems, have all been widely adopted and appropriated to that end. These systems are, in some cases, particularly valued because of the asymmetries they embody. Bloggers, for example, valued the asymmetry of engagement among themselves and their readers that is afforded by the technology:

> The relationship between blogger and reader was markedly asymmetrical. Bloggers wanted readers but they did not necessarily want to hear a lot from those readers…. Many bloggers liked that they could be less responsive with blogging than they could in email, instant messaging, phone, or face to face communication. They seemed to be holding their readers at arm's length [25].

In the following sections, we distill and unpack multiple forms of asymmetries of awareness systems.

Asymmetry of Media

There are numerous technologies commonly appropriated for maintaining awareness; this breadth of technology highlights the natural asymmetry of media used for purposes of awareness. Individuals likely do not employ all media and technologies in the production of their own awareness information, but many individuals are likely consumers of awareness information via a breadth of media that is produced by others.

Text is, perhaps, the most common medium for providing awareness information in instant messaging, blogging, microblogging, and social network sites. Photographs can be embedded within instant messages (see also [37]), blogs (see also [7]), microblogs, and social networking sites, as well. Broadcast video can be embedded in blogs (e.g., via YouTube[5]), whereas an instant messaging exchange can transition within the application to a video-based interaction (e.g., via Apple's iChat[6]). Audio-based awareness information, specifically to what digital music an individual is listening, can be broadcast within instant messaging (e.g., Current Track[7]) or via blog widgets (e.g., the Now Playing Plug-In[8]). Locative information can be shared on blogs [25], photoblogs (e.g., via geo-tags), and microblogs (e.g., via Jaiku[9]). Instant messaging applications frequently provide information about whether a particular individual is online or offline as well as more micro-level awareness information about whether an individual is typing within the instant messaging application.

Asymmetries of media are common within social networking sites like Facebook. In Facebook, different users can attach different applications to their online profile; this kind of asymmetry allows users to customize the way in which they present themselves to others and serves to provide an extremely wide variety of awareness information to others in their social networks, ranging from books that they have recently read, to online games they have won or lost, to the donations they have made to nonprofit causes.

Different individuals likely prefer different media as producers and as consumers of awareness information. The

[3] http://www.facebook.com
[4] http://www.friendster.com

[5] http://www.youtube.com
[6] http://www.apple.com/macosx/features/ichat
[7] http://sourceforge.net/projects/currenttrack
[8] http://sourceforge.net/projects/itunesnowplayin
[9] http://jaiku.com

breadth of media that can be utilized in this regard is surely valuable; yet, the perceived advantages and disadvantages of different media for providing awareness information remains an open research question.

Asymmetry of Fidelity

The fidelity of media when appropriated for awareness purposes is a function both of the detail conveyed by each piece of information as well as the frequency with which that information is produced. Blogs are generally used to provide richer information detail, for example, whereas microblogs are often used to provide more frequent updates to awareness information [23, 25]. Nearly all appropriable media in instant messaging, blogging, microblogging, and social networking sites can be used to provide the degree of detail preferred by the producer, who controls what and how much is communicated. In the case of plug-ins and add-on applications, the asymmetry of fidelity is also based on what and how many add-on applications are downloaded, installed and used.

Readers of blogs can also exert influence over the asymmetry of fidelity. In many systems, readers can first view a headline and the first few lines of a blog post. They can then decide if they want to increase fidelity to see the detailed posting.

The asymmetry of fidelity is cited as being one of the advantages of blogging. Bloggers preferred that they and their readers maintain an asymmetric relationship with respect to the frequency of interaction: "Bloggers…wanted controlled interaction, not the fast-paced give-and-take of face to face or media such as instant messaging" [25].

Asymmetry of Participation

A good deal of symmetry of participation has been explicitly designed into the use of most social networking sites. In Facebook, for example, one must create a profile and have either a mutually agreed-upon "friendship" or belong to the same afilliational network in order for either party to have access to one another's awareness information. Similarly, the awareness information that is provided via instant messaging requires both parties to have compatible instant messaging clients. However, depending on the particular instant messaging client, asymmetries in buddy list membership can occur: one person may permit another to add her to his buddy list but not return the gesture. Alternately, one may include another in her buddy list but assign the individual to a group whose membership is rarely made visible on the screen.

More asymmetry of participation is present in blogs and microblogs, most of which are publically available with an Internet connection and a web browser. Blog readers do not have to be bloggers, themselves, in order to take advantage of any awareness information conveyed through blog posts. In fact, blog readers do not have to comment on blogs or otherwise make their presence known in order to take advantage of the awareness information conveyed.

Existing research tells us that varying degrees of participation are a common characteristic of many communities and that allowing and legitimizing these varying degrees of participation, from peripheral participation to central, expert participation are important for drawing in new members of a community [11, 21]. The ability to draw in new members to an individual's social network was, in fact, one of the perceived values of blogging for bloggers:

> They yearned to develop an audience beyond their personal social network. The occasional email from a stranger who responded to the blog was often satisfying and motivating [25].

The characteristics of blogs that enable the development of an audience beyond an individuals' social network are the same characteristics implicated in its asymmetry of participation.

Asymmetry of Engagement

There is a pronounced asymmetry of engagement within most of the technologies being discussed due largely to the publish-subscribe models employed. Producers of content, particularly bloggers, expend more attention and effort to generate awareness information than do consumers in tracking that content. Syndication mechanisms such as RSS serve to increase this asymmetry of engagement, at least somewhat, between producers and consumers.

Instant messaging status information supports more symmetry of engagement, as many clients automatically update availability status based on implicit activity such as keyboard or mouse input throughout the system. Yet, like media spaces, instant messaging is appropriated for a breadth of practices, from peripheral awareness to direct communicative exchanges. Studies of instant messaging use have documented differences between the amount of attention paid to a single instant messaging exchange by co-communicants [38]. The breadth of levels of engagement supported and accepted within instant messaging has been identified by users in multiple studies as being particularly valuable [24, 38]:

> Together, ease of screening, delayed responding, and plausible deniability of presence allow recipients much more control over responding than with face to face interaction or the phone.... Instead of conversations taking place at the convenience of the initiator, IM allows genuine social negotiation about whether and when to talk [24].

> "I use instant messaging because it feels immediate, but I don't have to devote my immediate attention to it…. I can feel like I am having a conversation but I don't have to…drop everything just to have that conversation" (participant quoted in [38]).

Similarly, the asymmetry of engagement has also been found to be highly valued in blogging. Blogs can be attended to (or ignored) when opportune. Bloggers articulated that blogs were valued, in part, because they are "not intrusive. No one is 'forced to pay attention'" [26].