

Chapter 2

From Individuals to Third Parties, from Private to Public

With the spread of mobile devices into public settings and the increasing use of technology in cultural, artistic and entertainment venues, a corresponding need to understand the ways in which we might design successfully for such settings has developed. This chapter explores the steadily diversifying spread of technology, showing how the need for a general synthesis of existing conceptual and technological developments is becoming increasingly important. Central to this endeavour is the claim that we need new perspective on interaction with technology in public settings.

The first section explores a brief history of HCI and computer-supported cooperative work (CSCW) studies, examining how concern has shifted from the individual interacting with the machine to social ‘constellations’ in which groups collaborate via and around technology. After this we shall see how, more recently within this and other work, researchers’ focus has begun to shift towards these new kinds of settings, drawing not just from HCI, but also museum studies, performance art and games studies. Finally, we will return to the questions posed in the introduction, exploring them in light of this exploration of literature, in order to see how the questions might be answered, and in what ways those answers leave us asking further questions.

It is of course difficult to provide a completely comprehensive review of the developments in this area over the last fifteen or twenty years within (and outside of) HCI research. However, the purpose for this chapter is to provide a general overview and, particularly, to ‘set the scene’ for subsequent studies in this book. Furthermore, we shall revisit and expand upon this core body of literature in each chapter, particularly within Chap. 8’s framework.

2.1 Individuals to Third Parties

Paul Dourish notes HCI’s “origin myth”, being HCI’s initial emergence from the convergence between computer science and psychological, cognitive and social psychological models of interaction [35, p. 61]. In order to justify the claim that this

book forms part of a growing conceptual perspectival shift within HCI, it is worth spending some time here with this “myth” in order to understand the HCI context in which the concepts presented in here fit, and how examining third parties to interaction is increasingly pertinent to recent developments.

2.1.1 Understanding Individuals

Over the course of the computer’s relatively brief history, it has rapidly migrated in role from computation to communications device [105]. Driving this change in role is the increasing ubiquity of the computer, which historically began “reaching out” to those with less specialised expertise and knowledge about computational technology or lesser inclination to accommodate it. This is perhaps most evident in the way the computer has become a general workplace staple (such as in business communications, scientific computational uses, and so on) [53]. The computer has also been actively adopted by groups and individuals beyond its original use as a tool for work, in no small part thanks to its growing prevalence in the home, the unexpected importance and rise of the internet [81], and—of particular relevance for this book—its increasing ubiquity in the form of mobile devices like phones, laptops, music players and a host of other embedded devices. This ubiquity, coupled with the remarkable flexibility of the computer and technological developments in areas such as networking, has led to the repeated push of computation into new and diverse settings beyond the workplace and home, such as the public spaces of museums, galleries, performance and the streets.

These developments have often resulted in shifts in the focus of computer science research as well as the growth of new application areas. Research into human-computer interaction evolved in part as it became clear to developers of software with interface components that “the interface *is* the system, at least from the viewpoint of the users” [5]. Early work within HCI concerned itself with the various metrics and models that could be employed in order to assist a user’s task performance (amongst other concerns), the intellectual base of which grew from a background of experimental psychology and ergonomics. Quantitative and predictive low-level measures such as work rate and fatigue metrics, keystroke-level models, Fitts’ Law, and models such as GOMS [24] initially dominated HCI. These models typically attempted to provide tools for analysing a single user’s interaction with two-dimensional interfaces involving mouse and keyboard work. Such low-level perceptual, motor and cognitive models and metrics only dealt with very fractional slices of time, however, and different cognitive models gained increasing currency as researchers began to consider the interface as entering into a “dialogue” with the user—a dyadic relationship—and therefore stepping beyond viewing the interface as terminal [53]. Instead, Norman, developing concepts from Gibson [48], presented a formulation of the interface that is concerned with perceptual affordances (actionable properties that are perceived by a user). In the interactional dialogue, a user and designer’s “conceptual models” of the functionality the interface provides

access to are often found conflicting, resulting in “gulfs” of execution and evaluation where the user struggles to successfully predict the outcome of an action [82].

2.1.2 From Dialogues to Constellations

But the lower-level perceptual and dialogic views of interaction also began to be pushed wider as researchers started to broaden HCI in various ways.

The limitations of the lower-level experimental techniques typically used to evaluate interfaces became increasingly apparent, as such methods often did not reflect the settings in which human-machine dialogues would come to be played out. HCI was for a while “confined to rather small controlled experiments, with the presumption that the findings could be generalised to other settings” [4]. Those “other” settings—primarily workplaces—in reality consisted of multiple intertwined dialogues between workers themselves via or around the interface, as well as those of the human-machine dyads. Generally it had become increasingly clear that “[t]he interface [was] no longer a private affair between a single user and a single piece of technology as [was] classically studied in HCI” [21]. The scope of the observations of older HCI work also typically lacked in understanding a user’s continued engagement with interfaces. As Buxton argues, HCI has had a tendency to focus on the ‘first ten minutes’ of interaction as opposed to the ‘next ten years’ [2].

There were also more fundamental philosophical issues tied to this shift in perspective. It was suggested, for instance, that these settings could be addressed through avoiding a logical separation of ‘the users’ and ‘the interface’, with less direct focus upon the interface engineering issues (as found in Office Automation [55]) and more upon understanding the surrounding milieu of social action within which the interface comes to be embedded [30, 54]. Other philosophical shifts recommended viewing users’ conduct at the interface more as an ongoingly produced moment-by-moment form of ‘conversation’ in which circumstances are continually adapted to rather than being explicitly planned affairs [99]. Social psychology studies also began to reveal how cognition could be seen as more of a distributed phenomenon [72], providing some consonance with the view of interaction as being more than just a single user and an interface and that interaction as being ongoing and dynamic.

Perhaps prompted by the increasing importance of networking and the internet [81], especially in the role network communications within the workplace, research began to examine collaborative work rather than relying on a focus upon the individual and machine in order to solve the problems of human-computer interaction. CSCW in particular sought to address the “design of computer-based technologies with explicit concern for the socially organized practices of their intended users” [98]. In this stream of work, HCI came to be broadened by accounts of collaborative work provided both by studies of groupware and face-to-face interaction (e.g., [96, 97]) and various influential ethnographic, ethnomethodologically-informed, studies of technology in use at the workplace

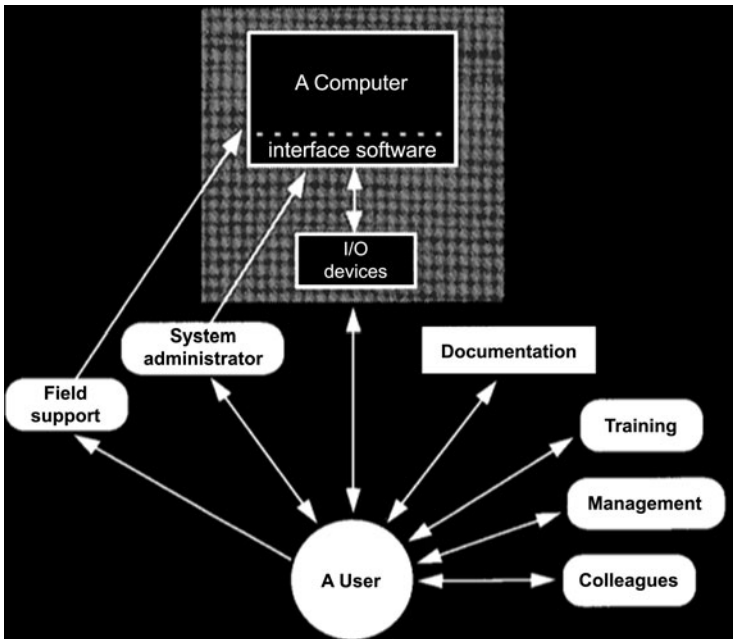


Fig. 2.1 A new vision of the interface, reproduced from [54]. [Image used with permission; ©Jonathan Grudin]

(e.g., [21, 58, 61, 65, 68, 99]). Many of the various parties conducting such studies were ‘outside’ the traditional field of HCI, such as ethnographers and anthropologists, social psychologists, and so on, but had as their topic of interest how social organisation is played out with and around technology.

This was a significant ‘turn to the social’, and represented the growing importance of ethnography as a rich technique for uncovering previously unaccounted-for social features of interaction with and around computer technology. More generally, the impact of these studies within HCI demonstrated the increasingly common concern for a more holistic view of interaction, exploding the typical HCI definitions of the interface as a purely technological artefact to encompass social constellations *as* the interface (see Fig. 2.1) [54].

In its focus upon collaboration around and through this exploded vision of the interface, Bannon suggests that CSCW became “an answer to certain problems within extant fields of research, such as mainstream HCI, and CMC (computer mediated communication) studies, and their relation (or lack thereof) to the understanding and design of computer systems that truly support the needs of people working together” [4]. Or, as Heath et al. describe of working environments, reforming understanding of these needs involves seeing how “collaboration, as a delimited form of cooperative work, is simply a gloss to capture a complex configuration of momentary arrangements through which two or more individuals, sequentially or simultaneously participate in particular tasks or activities” [60].

2.1.3 *From Constellations to Third Parties*

However, within earlier, now seminal CSCW research, which examined private settings like the office [21, 37, 99], air traffic control at an airport [69], or rail network control rooms [65] (also see [58] for a companion study of the rail drivers' perspective), there has also been a notable concern for issues relating to a third party experience of interaction through observations on aspects such as peripheral awareness and tacit coordination.

For example, in [65], operators in the London Underground control room under study rendered otherwise 'invisible' activities visible for others, through methods such as talking out loud, and ensuring the sensitivity and relevancy of such actions with respect to co-workers through continual (mutual) monitoring. Such peripheral awareness was also shown to be maintained through objects as well as conduct. Hughes et al. [69], for example, discuss how an air traffic controller's 'flight strip' (a literal strip of paper used to coordinate airspace) is employed not only as an artefact with which a given controller may work, but crucially as a publicly available common resource for fellow controllers. Some of these issues were also reflected upon within virtual environments, such as in the MASSIVE system [8], in which a spatialised model of interaction [9] governing what members of the environment could at times see and hear, came to provide a peripheral awareness structure as an important feature in everyday virtual interactions.

Although these studies are for the most part examinations of collaborative activity amongst participants who are equally engaged in some task, key features of the spectator experience are hinted at, and to some extent brought into relief above the apparent 'flatness' of the equally-weighted participatory settings under examination. These features (noted above) will later come to play an important role in how we build up an analysis of a more performative view on interaction.

2.2 Private to Public Settings

The previous section documented how the initial HCI view of an individual's interaction with a single machine gradually evolved into constellations of mutually aware, often peripherally-interacting users engaging in practical, mundane, everyday work via and around the interface. Relatively recently, however, computation has extended beyond the settings which gave birth to such perspectives, "reaching out" from private¹ workplaces into public museums, galleries, artistic performances, clubs and the streets. In common with [34], this book argues that concepts drawn from workplace studies have relevance to settings in which the term 'work' is more explicitly used as an analytic device (although see [89] for an alternate perspective). This ever increasing ubiquity of technologies in such settings not only

¹CSCW has also begun to concern itself with other private spheres, such as the home.

provides challenging new applications of such concepts, but may further complexify the picture, such as through ‘blurring’ the very boundaries between private and public domains [80].

This section takes a tour through the literature documenting these new settings, indicating the need for a coherent framework that draws together the various observations presented within this disparate corpus. At first it examines how studies of museums and galleries have explored the interactions of visitor groups at the exhibit face, the role of third parties to those interactions, and the ways in which they are integral to understanding the social nature of the visit. Subsequently it looks at some of the literature documenting the growing reach of technology into more everyday public settings such as city streets, and how the arts—which have for a long time been concerned with the relationship between performer and spectator—have developed a growing interest in and use of novel technologies.

2.2.1 Studies of Museums and Galleries

Like the trajectory of HCI’s programme, studies of museums and galleries began with an early relationship with psychology, such as work by Melton and Robinson in the 1920s and 1930s, to later application of behaviourism [93], cognitivism [1], environmental psychology [15], and, more rarely, ethnography [78]. Measures such as ‘dwell time,’ number of objects viewed and routes traced during visits were (and still are) routinely derived from survey data in order to determine the quality of a visitor’s experience [75]. There are some problems with this approach, however, not only in that interactions take place between a “lively triadic interplay” of visitor, exhibit and environment [102], but also since visiting typically occurs with others. Blud notes that studies “have tended to ignore the nature of the visitor, or visitor group, and have focused instead on the nature of the exhibit, and how effective different types of exhibit are in stimulating learning” [17]. Indeed, the role of the spectator has been problematised by 20th century art within galleries for some time [70].

Recently, however, particularly with the introduction of interactives in museums and galleries, new interest has been generated in moving beyond quantitative metrics in order to understand the exhibit face as a site of collaboration and coordination between friends, family and even strangers. Many of these developments in understanding the sociality of museum and gallery visits, particularly those on the importance of third parties to interaction, have occurred outside the traditional museum studies literature.² Of particular centrality in this body of work is the Work, Interaction and Technology group, which also undertook the influential studies of the London Underground rail network mentioned earlier [65]. Using video recordings captured at many major museums and galleries, WIT group work (such as [62]) has

²Interesting, however, artists have attempted to draw the spectator into the artefact (such as a painting) for a long time [91].

examined the ways in which visitors collaboratively conduct themselves, through gesture and talk, at the exhibit face. Like the group's previous work, much is made of the tacit coordination between visitors in museums and galleries. Sometimes this collaborative action proves problematic for the way existing exhibits have been designed. In [63], for example, observations on the deployment of "conventional input and display technologies" used in exhibits in this particular study were found to "undermine the collaboration of others by restricting the ability of people gathered at the exhibit to see the screen". Elsewhere, the ways in which co-visiting groups subtly "configure" one another's engagement with the exhibit is detailed, as well the notion that such engagement has a distinct interactional 'trajectory' in which action at previous exhibits may configure the approach to the next [77] (this concept of interactional trajectories has found broader application within HCI; see [10, 11], which we will return to later in the book).

Crucially here, observations are also made on the behaviour of third parties and general awareness of others in configuring conduct of visitors, such as in aiding and encouraging participation or perhaps in hindering others [76]. One particularly notable study (discussed in depth in subsequent chapters) examines the humorous interactions by visitors engaging with an exhibit, and how this activity drew the attention of bystanders, who, being oriented by their spectating of others, subsequently engaged with the object themselves [64]. In a further study, documenting an interactive video-based exhibit called the Ghost Ship [66], visitors were observed designing their actions to appear within the artwork, although interactions between strangers were limited. To remedy this Hindmarsh et al. recommend recognising and designing for "companions and strangers, whether they are in the same physical space or indeed remote spaces" through providing "opportunities for interaction" since, as their studies have suggested, the "actions and activities of individuals are often produced with intimate regard to the actions of others in perceptual range".

In light of some of these observations, a system designed to support a form of 'aural spectating' in museums is of interest here. The Sotro Voce system (which also will be revisited later on) permits co-visitors (rather than strangers) to eavesdrop upon their fellow visitor's PDAs (users were presented with selectable items for each room). Several themes of operation emerged, such as eavesdroppers "free riding" on the other's exhibit exploration, and visitors drawing on overheard content as a locational resource [3, 52].

Numerous other studies have further charted the growing presence of interactives within exhibition. The Augurscope device [90], for example, provided a mobile window onto a virtual recreation of a castle, which visitors could then move around the real site. Developing this, the Storytent [45, 51, 95] enabled visitors (particularly children) to take part in activities linking virtual visualisations of mediaeval buildings and stories with the corresponding real site through augmenting physical artefacts such as paper, or projecting onto the surface of a tent. Other exhibitions have attempted to embed interactives more seamlessly into the environment visitors would experience by 'hiding' the technology [43]. Alternate approaches to augmenting the experience have involved distributed systems designed to provide for sharing the experience of a museum's various objects between remote and local

museum visitors [23], again involving implicit spectating. Finally, designing museum and gallery interactives has also opened up a seam of research that examines the use of ambiguity in a variety of aspects of design [46]. Ambiguity comes to play a role in provoking spectator curiosity in work such as the Tonetable [19], in which non-linear mappings between visitor interactions with the system and the effects of those interactions encourage further engagement and exploration. This will be particularly relevant later on in Chap. 8's framework.

Beyond museums, interactive technology has also reached public or semi-public settings outside of the confines of the exhibition, such as in educational and recreational uses. Some have begun to embed technology into relatively complex educational and creative indoor environments, such as the KidsRoom [18], which involved an interactive storytelling setting for groups of children. Others push out into the streets using mobile technology. For instance, technologies to support tourism on city streets have been developed to enable the sharing of photographs and physical presence (through positioning) with others [22]. Educational experiences such as the Periscope [103] within the Ambient Wood [57] involved the design and deployment of various technologies (displays, RFID readers, etc.) within a woodland setting. Another educational game, Savannah [13], saw players assuming the role of 'lions' hunting prey with PDAs whilst travelling around a virtual savannah, which in reality was a school playing field. Finally, studies of spectating at rally events have highlighted the importance of "spectating [as] a venue for conversation and sociability" [42].

The summing of this work indicates that, within an increasingly wide array of deployments of technology in public settings, issues of spectatorship and third parties arise frequently as concerns for design.

2.2.2 Technology on-the-Streets and in the Arts

As the spread of technologies such as public displays, wireless internet infrastructure, or personal mobile technology has become more prominent as everyday components within public and semi-public spaces, so corresponding interest in the impact of technology within mundane everyday settings, such as mobile phones on the streets (e.g., [47, 74]), has risen.

One of the more interesting results of this spread, however, is the way in which technology has also become an important part of many art installations, performance art pieces and musical performances. Such performances may be played out in semi-public settings, such as the Schizophrenic Cyborg system, in which a remote orchestrator controlled a display attached to a performer's chest whilst they were present at a party [92]. Performances are also conducted in more prominent public settings including city streets, such as the performance art game discussed in subsequent chapters, *Can You See Me Now?* [44]. (See the many systems documented in [104] or the theoretical concerns regarding interaction with interfaces expressed in [41], for example.) Whilst street performance has always been a staple

within the performing arts, and also considering how interactivity similarly has been a long-standing concern for artists (see [70]), more recently it has become apparent how technology provides exciting new ways in order to augment performances in a variety of contexts (e.g., the installation piece *Desert Rain* [73] and Toshio Iwai's visually augmented pianos [104, p. 767], both discussed later in Chap. 8) as well as performers themselves (e.g., see [85, 86, 94] detailing various systems for instrumenting dancers or their environments). Technology has also begun to provide increased interaction between audience and performer, such as in Stelarc's *Muscle Stimulation System* piece where audience members could 'activate' parts of the performer's body [104, p. 159] (see Chap. 8).

More generally, performances inherently trade upon the conduct of third parties (the audience) and the dynamic ways in which the relationship between performer and spectator unfolds. Thus, such contexts in which technology is deployed, and the importance of audience to those activities that are played out, provide fertile grounds for studying public interaction.

The highlighting of performer skill for spectators is just one of the possibilities of augmentation. For many performers, making performances legible when using technology is important to their practices, as when control sensors may be purposefully attached to hands or arms (e.g., [40, 106], examples which shall be explored in more depth in Chap. 8) in order to provide the scope for what Bowers and Hellström term "expressive latitude" [20]. This aspect of interaction has also been explored in terms of interactives in museums and galleries, where 'expected' interactions that users naturally conduct their activities with may map with varying levels of directness to what is actually sensed by the interface [14]. This obviously has impacts for the experience of the spectator, however others note that non-linear mappings may also provide a design opportunity through provoking intrigue [19].

In one example, in the interactive martial arts games of [56], a performer's expertly skilled martial arts moves are conducted on stage in front of an audience, and also tracked and mapped to a corresponding projected avatar within a game environment. Technology might also push the physical boundaries of where audiences may be in order to engage in spectatorship. For example, in one system, a poet's bodily actions and spoken words were synchronously relayed to an audience located in a CVE as well as the real audience they were performing to. Poets were represented as avatars in the virtual world with the gestures of the performer driving those of their avatar [12]. The ways in which such systems are designed is made all the more pertinent by the advent of mainstream performances taking place simultaneously in the real world and popular internet-based virtual environments [6]. In other, more directly participatory events, designing for spectators may require explicit separation from performers. For example, the *Tonetable*, an installation that enabled up to four visitors to collaboratively interact with sound and visuals via a series of trackballs [19], initially suffered from spectator crowding, meaning that some essential aural 'sweet spots' were obscured. A redesign of its deployment had to take into account these crowding effects and the impact upon sound, resulting in separate areas being used for those 'performing' with the device and those spectating.

Studies of performance have also identified different performative roles or tasks that have often been inspired by studies of museums, galleries and workplaces. En-

surings the smooth running of a performance via control room and orchestration work has received recent attention, identifying routine activities such as monitoring work via technology as well as both subtle and deliberately highlighted intervention conducted by orchestrators to ensure the smooth running of the performance [31, 33, 39, 73]. Other studies have explored the role orchestrators play in collaboratively producing and maintaining narrative with players of an interactive mobile phone messaging-based game [32]. The design challenges presented when technology is used to manage relationships between performers and audience have also been covered, as in [12]. Observations on the nature of orchestrator roles and relationship between them, other performers and audience members within performance environments will be important for the studies presented in later chapters, the analysis they develop and the framework that is constructed.

Collected works or anthologies of artistic involvement with technology, such as [104], provide ample documentation of the increasingly central role interactive technology takes in supporting, or sometimes being the centre of, performance. Much of the presentation of the framework covered in Chap. 8 uses a wide range of examples from such literature, covering artists including Stelarc and Pamela Z.

Theoretically, however, academic artistic concern has often resided with increasing active engagement in the performance, characterised by transforming “viewers into participants” [41]. Frameworks dealing with the role of technology thus address how technology modulates a performer’s relationship to the technology as a varyingly active participant (e.g., [29]) rather than exploring how spectators may be party to that very relationship. Some frameworks, however, have begun to examine the role that technology may play in performativity, particularly in “tripartite interactions” between collaborating performers and “observers” [92]. This book builds upon the observations of such frameworks through picking apart further details of the spectator experience, enriching them with a wider set of performative roles, and investigating more dynamic aspects of performance with interfaces in public settings, such as the ways in which members of a performance context transition between particular roles.

Techniques for mass spectator or audience participation have also generated interest within other contexts. Some large-scale interactives have been constructed in order to permit public use of musical instruments for visitors to an exhibition [84]. This and other demonstrations, such as the aggregation of audience behaviour to engage in large-scale gaming or mass participation events [25, 79] and even clubs [67], provide relevant examples of the need for new ways of understanding a variety of diverse public settings in which, through the impact of more prevalent and widespread sensor technology, bystanders and spectators may become drawn into some collaborative activity.

Finally, this section must address a number of recent examples of games. The game, as a form, is used in many of the settings presented above to serve the purposes of the designers, artists or educationalists. However, a number of more ‘pure’ demonstrations of gaming in public settings typically involving mobile technologies (usually classed as ‘locative’ or ‘pervasive’ gaming) have begun to emerge as well. One such game is Treasure [26], in which players take to the streets with PDAs, collecting coins from a game map derived from wifi network coverage. Another game

called AR Quake [101] used augmented reality in order to transpose the gameplay of a popular first-person shooter into the real world by overlaying tracked virtual monsters on the local environment. Other games have taken place on various forms of mobile phones, such as Hitchers, in which virtual ‘hitch hikers’ are picked up and dropped by players as they physically move between phone cells [38].

Whilst there are further examples of game systems running on a variety of mobile technologies and played out in locations where strangers are present (e.g., [16, 28, 83, 88]), as well as early work on the social features of game-play (Huizinga in particular, discussed below), little documentation and even fewer frameworks exist on how player interaction with such systems either involve or are experienced by third parties (although there are design frameworks concerned with how individuals may interweave technology use into everyday life [27]). Some observations are forthcoming, however. One ‘farming’ type game called Yoshi [7] often involved “distinctive back and forth movements” by players; this conduct, given that it was typically played in the streets of urban or suburban areas, would tend to draw attention from passers-by. A player also reported being asked by one such stranger whether they were lost and reported receiving “strange looks” from other pedestrians. Finally, a recent study of the social gameplay practices surrounding Nintendo DS users considered issues such as how the small display impacted the experience of play for spectators in multiplayer gaming, how the design of the device “actively work against” ad-hoc play formations involving strangers, and in referencing published work that contributes to the framework within this book [87], the ways in which such problems might be addressed by designing for the spectator [100].

2.3 Revisiting Opening Questions

So far we have threaded together one way to view the forms of literature and the settings they document that have been reviewed here. However, although this literature contains, say, observations on mutual awareness, configuration effects of bystanders and public interaction on-the-streets, there are few frameworks presented within it which seek to systematically address this wide range of public settings in which computational technology may increasingly be found. As such it becomes apparent that there is a need to synthesise this sometimes disparate work; in order to provide an overarching set of design understandings (in the form of sensitising concepts, a shared language, constraints and strategies and a new HCI perspective as mentioned in Chap. 1), we will seek to encompass the earlier observations highlighted in this chapter as well as develop and enrich them into a general framework.

It is also relevant here to note once again the relevance of Goffman’s analysis of interaction in public, his dramaturgical perspective (e.g., [49]), and the ways in which this perspective will be drawn upon throughout the work presented in this book. In order to answer the key opening questions, several of Goffman’s concepts are of use. Firstly, and primarily, Goffman’s use of the performance metaphor as an analytic lens through which to examine social conduct, is present both within the analytic findings of study chapters (e.g., conceptualising interaction in terms of

“performers” and “audience”), and fundamental to the framework. Another concept that we shall continually revisit in this book is the ‘frame’ [50], and the way that social situations are organised by the ‘frameworks’ of members and how conduct is interpreted within the context of the social frame. Goffman also developed notions of performative settings (or “regions”) such as “front”, “back” and “outside”. These are used to differentiate the ways presentation of the self occurs in social action: for instance, front-stage reflects framings in which a ‘performer’ conducts themselves in front of an ‘audience’, whereas back-stage involves alternate settings that audiences do not have access to, where a performer may operate using an alternative framework. Later on we will use these ideas of ‘setting-ed’ interaction and performance frames in building up a design framework for interaction.

The opening questions hinted at both the form and breadth of the challenges that any framework addressing this space would need to consider. From this brief review of the ways in which investigations in HCI have moved from understanding an individual’s interaction with a machine to beginning to consider the role of third parties to interactions, and from interest in private to public settings, it is apparent that these opening questions either remain unanswered or only partially answered. In closing this chapter we’ll look once again at these questions.

- How can we design interfaces that support users in expressing their interactions, and that fit well with existing expressive activities such as music and dance?

Sections of the work we have seen in this chapter document the activities of performers and artists who have increasingly adopted technology in order to express themselves (see [104] in particular). What is not clear for the most part is how the craft knowledge of artists like Stelarc in their use of technology may be drawn upon in order to inform the design of interfaces. Understanding collections of such craft knowledge and how they may be repurposed can in turn guide the design of expressive interfaces within more mainstream HCI. This book will seek to collate some of this craft knowledge, and in response to these, will develop a set of strategies not only to address expressivity, but will also provide other strategies which engender, for instance, ambiguity in the interactional experience, or magical effect.

- How should a third party experience a user’s interaction with an interface?

It has been made clear that, particularly within studies of museums and galleries, as well as workplace studies, understanding how to support users in expressing their interactions is intimately tied with how those interactions are experienced by others, however such observations are only just beginning to enter into the main stream of HCI. The framework directly addresses this issue, starting in Chap. 4 with a basic division of third parties and users. In this book we shall begin seeking to integrate existing observations—and contributing new ones—into a larger framework that presents an understanding of interaction with technology in public settings *in general*.

- How can participants be made aware that a performance is occurring and understand the boundaries and limits of the performance, especially in public settings where performance may be interleaved with other activities?

Some descriptions delineate the transient and negotiated rules of games, specifically Huizinga's [71], in which players are seen as coordinating around a set of rules—the “magic circle”—separate from the shared ‘rules’ of everyday life. Other descriptions, particularly Goffman's concept of framings [50], relate to the question of how, particularly in public settings, participants can be made aware that a performance is occurring, and, in commonly orienting to the socially organised boundaries of a given performance framing, may come to understand how to collaborate with others in the performance (in the case of Huizinga these boundaries form the heart of the organisation of a game). However, such work remains mostly unapplied to the design of technology situated in public environments. This book will integrate such perspectives into its observations on third parties and expressivity.

- How can interfaces be designed to accommodate transitions between roles, for example when a current user hands an interface over to a new user in a setting such as a crowded public gallery?

This survey has demonstrated how workplace and museum studies literature have for some time been examining in detail how colleagues or visitors may negotiate around an interface, and how objects, such as museum artefacts, may be ‘handed over’ between visitors as a typical part of the visit. There is room for building upon this work, understanding how it might fit within a larger context of performance and performative action by professionals expressing themselves with technology, handing that technology over to co-performers or non-professional participants. In this book we will investigate, in some depth, key moments of transition both in the analysis of such moments in each study chapter, but also more generally as a fundamental part of the framework.

- How can we design for orchestration; the ongoing shaping of a performance, typically from ‘behind-the-scenes’?

Existing literature highlighted above seeks to understand how behind-the-scenes orchestration might fit in to a wider view of performance in which various professionals collaborate and coordinate in order to run the performance. This activity can be understood to fit within the context of less explicit performance situations such as the workplace or the museum, however it remains unaddressed within the literature. This book attempts to join these contexts up.

Before closing, it is perhaps useful to think about two main ways in which the literature presented here may be thought of more systematically. The first is through a division of private and public settings, ranging from private spaces like offices and homes, to semi-public spaces such as museums and galleries, to ‘open air’ public spaces like streets. The second division differentiates everyday, ‘mundane’ settings from deliberate performance settings, ranging from interactions occurring in offices or streets, to virtuosic conduct with technology taking place in front of paying audience members.

Later on we will build upon these simple divisions of this wide range of work in order to understand what the spread of computation into public settings means for design, and how understanding that meaning can form the basis for a framework. In

particular, Chap. 4, examining social interaction around augmented reality exhibit, will begin to pick apart divisions between third parties and users actively engaged in some interaction, exploring the relationships between the two and how their conduct is intertwined with interaction with an interface.

Before these studies are presented, however, there are various methodological and analytic issues that we must attend to in order to understand the findings discussed within them. The following chapter situates this book within the tradition of ethnomethodologically-informed ethnography found commonly in CSCW, and explores how this, and Goffman's dramaturgy, influence the studies and framework. It also takes a lens to the practical matters involved in using these conceptual orientations, particularly as it relates to video-based interaction analysis [59]. In addition to exploring these two sides of analysing and producing findings from empirical data, the chapter reveals the relationship between two sometimes awkward bedfellows, connecting with recent concerns voiced within HCI regarding "implications for design" [36].

Readers familiar with this tradition and these debates may wish to skip the next chapter and head straight to the series of studies in Chaps. 4–7.

References

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2011, XII, 196 p., Hardcover

ISBN: 978-0-85729-264-3