Facilitating the First Move: Exploring Inspirational Design Patterns for Aiding Initiation of Social Encounters

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ABSTRACT

Actualizing positive social encounters remains both a key ends and means in many activities to foster a sense of community. Initiating encounters between strangers typically requires facilitative activities or artefacts, such as icebreakers or tickets-to-talk. However, there is little understanding of which designs are effective and why, and the broad design space remains largely underexplored. We address this challenge by presenting five candidates for inspirational design patterns on signaling social intentions and identifying impediments that deter commencement of encounters. The principles result from an extensive review of design cases and public art installations. Through focus groups and expert interviews, we assessed the perceived applicability and social acceptance of the proposed patterns. Three new design principles relating to the risks of initiating an encounter emerged through analyzing participant responses. These articulations of possible approaches and pitfalls for increasing conviviality may broaden the repertoire of, and support discussion between designers and others concerned with collocated social interaction.

CCS CONCEPTS

Human-centered computing → Collaborative and social computing → **Collaborative and social computing devices**

KEYWORDS

collocated interaction; design patterns; social encounters; social encouragement; social interaction design, ticket-to-talk;

1 INTRODUCTION

Urban communities arise as a result of a complex interplay between the material and the interpersonal: "Social and physical environments do not exist independently of each other; any environment is the result of continuing interactions" [13]. The social both drives and is driven by physical arrangements: "space organisation is born social, constituting as well as representing society" [32]. Accordingly, designers of public space now prioritize providing opportunities for collocated interaction: "Mainstream urban design theory and practice are explicitly pro-social: the importance of socializing in outdoor public spaces is promoted" [55] as "the city of the twenty-first century is being reimagined as a site of connection" [64:324]. A "convivial turn" in human geography and planning [48], has highlighted the importance of semi-public spaces such as cafes and markets as 'sites of civic promise' [4] that provide opportunities for contact with unfamiliar others and a sense of togetherness and potentially "incubate convivial multiculture" [1].

However, in both public and semi-public spaces, merely being collocated "does not equate in any simple way to social encounter" [63]. Even when there is a mutual willingness to interact, initiating or engaging in social interaction with a stranger is difficult for many individuals [15]. Successfully approaching strangers in public places necessitates considerable skills [38] [45] as individuals are generally reluctant to engage with unfamiliar others. While in some cultures or communities there are conventions of small talk or mingling, in some others people might lack the cultural acceptance or practices to do this. In addition to increasing the sense of community in neighborhoods, initiating a conversation with a stranger is considered a desirable goal in various other communities of collocated people, e.g. work places and schools (e.g., [2]) and also innovation activities [53].

Practitioners and researchers from many fields have proposed a wide variety of interventions [62], gadgets [51], installations [29], objects [49], and apparel [41] to support initiating interactions between co-located people. However, a systematically presented collection and analysis of existing social icebreaking design examples appears lacking. There seems to be little understanding of the design space as a whole, not to mention its key dimensions and variables. The lack of design theory easily results in various unconnected design cases lacking proper reflection. One symptom of lacking a holistic perspective is how similar design concepts appear to independently re-occur in different branches of culture

and knowledge. In particular, technology-led research experimentation appears disconnected from DIY folk solutions and deliberately provocative concepts presented by artists and experimental designers.

As in any design practice, efforts to address this challenge would benefit from general patterns, heuristics, and other conceptual tools that help define and conceptualize the design space. In an attempt to bring together and systematize widely scattered design cases, we have been conducting a design space review examining diverse examples of both high and low-tech efforts for fostering new encounters between strangers. The contributions of this paper are largely conceptual and comprise the following three aspects: 1) we present five candidate patterns derived from our design space review, particularly focusing on signaling social intentions and impediments that prevent people coming closer and acting together. 2) We present an evaluation of these candidate patterns based on a series of focus groups and expert interviews. 3) We offer a synthesis of this evaluation through proposing three general design principles concerned with supporting the initiating of new encounters.

2 RELATED WORK

We argue for our work's relevance firstly regarding frameworks on designing for collocated interaction and then a need for further theoretical glue and practitioner-friendly design insights.

2.1 Social interaction design frameworks and principles

Martin Ludvigsen's design framework is helpful for articulating stages to build social collaboration [40]. He argues that in order to develop installations to bring strangers together, designers should think in terms of how people can be induced to progress through four different phases of co-located experience from an initial level of distributed attention upwards to increasingly higher levels of shared focus, dialogue and collective action. Ludvigsen contributes the concept of *situational interaction mobility* to express the degree that people can choose to move between these different levels of mutual attention [40].

In what might be seen as an echoing of Hindmarsh's advice to developers of interactive multi-user museum exhibits to "consider the relationship between action points and viewpoints" [30], Eva Hornecker et al. draws attention to the importance of designers providing "minimal barriers" in respect of "entry points" and "access points" to a system in order to induce sharing behaviors around, and through interfaces [32].

Olsson et al.'s [50] recent systematic review of information technological solutions for enhancing collocated interaction proposes a hierarchy of design goals and approaches to be inspired by. They focus on conceptualizing *enhancement* in this context and indicate that it has taken various forms in prior design explorations: from *inviting interaction* through providing information that might spark social interaction to facilitating interaction by IT applications serving as icebreakers or tickets to talk, and *encouraging* interaction by motivating people to interact or engage in joint activities. While their review provides a solid conceptualization of a broad research and design space, its focus was mainly on categorizing prior ICT-based solutions, and could not reach strong conclusions on which kinds of designs work better than some others. In contrast, this paper focuses on physical forms of interaction design as interactive technologies are often considered counterproductive to conviviality. In order to offer insights for the designs of tomorrow, we inspect a mix of relatively low-tech and no-tech design examples. We would argue for the value of their relative simplicity as a stepping stone to understanding the ever-shifting complexities of designing for how people interrelate.

2.2 Accessible and usable abstractions

Hornecker [34] and Mueller [46] among others, have called for human computer interaction guidelines and frameworks for whole body interaction to be presented in ways that are accessible for practicing designers. Furthermore, as designing to support social encounters can involve and impact upon many different kinds of stakeholders, we sought a non-academic format for ultimate dissemination of our design space review. Thus we turned to the notion of *inspirational design patterns* that emerged from design patterns (as explained previously in [42] and [43]).

Design patterns capture how recurring design problems are commonly addressed through generic, re-usable, and structured descriptions of typical solutions. In the words of the architect Alexander who originated the concept: "Each pattern describes a problem…and then describes the core of the solution" [3]. Many researchers and practitioners within computer science and design have adapted and extended this idea, proposing, for instance design patterns and pattern languages for challenges faced in Human-Computer Interaction [17] and interface design [61].

Our work relates to Hespanhol and Dalsgaard's identification of how recurring social interaction patterns of media architecture lack cross-case analysis [28]. The patterns they present are very useful as a systematic review of how general social interactions can unfold around media installations. We focus on the narrower challenge of understanding strategies for supporting collocated interactions between strangers but take a wider scope in the cases that we examine. We are also influenced by the idea of *Embodied Facilitation* that highlights how group behavior can be influenced by different configurations of physical objects and space [34].

Design patterns and pattern languages are typically encapsulations of well-established design conventions [3]. The design knowledge captured in architectural and urban design patterns draw upon sometimes as much as hundreds or thousands of years of built environment traditions. For making accessible the insights gained via comparing diverse digital-physical practices, we prefer Löwgren's concept of *inspirational design patterns* [39] Inspirational design patterns attempt to fast-track insights from experimentation with new technologies into accessible formats that may help "broaden the repertoire of the interaction design community" [39]. We deliberately draw upon unproven, experimental and provocative designs. Although the "solutions" they suggest are often unwieldy, they can offer a vivid articulation of a problem and a fresh perspective on addressing it. The strong

reactions they garner can also help unlock unarticulated needs, wishes or fears. Posing a variety of approaches is also hoped to stimulate new thinking by enabling comparisons between qualities of designs and open up for possible combining of different elements. Contextual factors are hugely important for the success of any social catalyst design [7] [27]. Our intention in developing inspirational design patterns is not to provide prescriptions but rather stimulus that a designer can draw upon in relation to their own particular design challenges, constraints and contexts.

3 METHODOLOGY

3.1 Candidate inspirational patterns from a design space review

Through an iterative analytic and participatory process of workshops and seminars, as reported in [43], a corpus of over 1000 design examples was analyzed and whittled down to produce 25 candidates for inspirational design patterns, each exemplified by three creative projects. The examples for each inspirational pattern are deliberately varied to enrich discussion around the abstractions in that some examples are more practical and clear exemplifications of a pattern, while others are more extreme designs that convey an aspect of the abstraction. Some of these patterns have been grouped into themes concerned with filters [43], proximity [42] and rhythm [44]. Here we discuss a further five unpublished, candidate patterns (figure 1) that share themes around signaling social intentions and identifying impediments to encounters developing.

3.2 Assessing the candidate patterns

To gain a range of opinions on the candidate patterns we involved 19 adult participants, from academia and industry in the study, and used a combination of focus groups and individual interviews to provide critical feedback on the perceived applicability and appropriateness of the design patterns. A diversity of participant backgrounds from both practice and theory was sought in line with aims for pattern languages to be a "lingua franca" [21] for multidisciplinary teams. There were three focus group sessions with self-selecting sets of participants informally recruited during an open evening event at Z/KU, a creative urbanism centre in Berlin. Subsequently 10 diverse experts were selected for relevance to the topic and invited to take part in one-to-one interviews with the first author.

Participating practitioners worked in a range of fields relevant to human-human encounters, including two community project managers, two architects, a mixed media artist specializing in interpersonal encounters, a producer of international networking events, a special needs educator, director of an urban art museum, an urban health consultant, a mechanical engineering manager, an infrastructure engineer, a physiologist, and a marketing manager. The five academic respondents were all of different nationalities, from different institutions, and of different ranks, from research assistant to full professor with specialties including facilitation, interactive physical products, social sustainability, and collaborative game design. Participants originated from 11

different countries, in four continents, and all but three participants mentioned experiences of having lived in one or more additional countries. Participants' ages ranged from early-twenties to post retirement age, with most aged 30 – 50.

3.3 Procedure

Both the focus groups and individual interviews were conducted similarly. Firstly, the projects' aims were briefly explained. Namely, to increase the understanding of different media, forms and mechanism for fostering new social encounters in cities. It was emphasized that the aim was not to identify universally applicable solutions. Rather the quest was to consider how designers could support people that might have difficulties on some occasion, in some situations. Participants were asked to prioritize giving opinions based on their professional expertise, but giving views based on other experiences were also welcome.

Participants were first shown a problem statement concerning a possible impediment to initiating an interaction. After discussing this for a few minutes, participants were then given an A4 sheet of a candidate inspirational design pattern. The sheet featured a title, a repeat of the problem statement, captioned examples of three design examples and a one liner of advice for addressing the identified problem (figure 1). The interviewer briefly explained the form and functioning of the design examples, and answered clarifying questions. Participants were then asked to evaluate the suitability of the design examples for addressing the stated problem. After giving comments, the process was then repeated with another randomly drawn problem and its corresponding card. Participants were asked to focus initially on responding to one sheet at a time, but other points about previously discussed cards was also welcome. Five of the participants only had time to respond to four of the five cards.

An obvious limitation is that participants were responding to images and brief descriptions of design examples rather than on the basis of e.g. their own experiences, or scientific evaluations. However, we suggest these responses still have value in relation to the overall research goal of organizing folk knowledge for fostering community in easily accessible formats. We would like to stress that participants were asked not to evaluate the art and design examples per se but were asked to discuss them in relation to the abstraction of the candidate patterns. Not least, because in many cases the motivations of the creators of many design examples were either unknown or different from the candidate pattern headings under which we grouped them for this study.

3.4 Analysis

After completing 13 data collection sessions, a thematic analysis of responses was performed. No differences in opinions between group and individual interviews, or as a result of background, gender or other demographic were discerned. It was clear that the three most recent interviews revealed no new themes and thus it appeared a saturation point [24] had been reached, and so no further interviews or focus groups were conducted

4 RESULTS

Before presenting a breakdown of responses to individual candidate patterns, we feel that these results should be framed by the two overwhelming characteristics of responses.

Firstly, experiences and knowledge of physical interaction design was not prominent in their responses. Participants responded more with reference to life experiences outside work (often recalling incidents from childhood and youth) or when discussing the professional realm, focused on actions they took or observed as a person. For instance, how they behave as an event host, facilitator, or sharing insights and challenges in classroom management or how they adjusted in migrating from one culture to another. Although many participants had experience with, and were familiar with many interactive interventions that aimed to, or were claimed to boost sociality, they recalled very few examples that they believed to be successful in such aims. We take their skepticism concerning designing to foster encounters as encouragement for our project's aims in advancing this field through systematizing and exchanging design insights.

Secondly, on the whole, participants were rather negative concerning the feasibility of almost any successful intervention in very public places. Unrestricted environments were considered too diverse and potentially dangerous for commencing interactions with unknown others. In some ways this skepticism was surprising. For based upon their reported backgrounds, and interests, and compared to the general population, respondents were relatively expert about and sympathetic to creative urban experimentation. It was perhaps their understanding of the public realm that tempered their enthusiasm and enabled a constructive critique. Participants pointed instead towards how many of the presented examples patterns had potential for positive impact in semi-public situations where there was some kind of commonality or familiarity between collocated people. Thus they aimed most of their constructive criticisms towards addressing the non-physical risks of new encounters in such contexts. Like our other inspirational patterns [42, 43, 44], the candidate patterns presented in this paper all feature three diverse design examples. Some of our other patterns are exemplified by purely physical designs, whereas we chose to present here five candidate patterns that are illustrated by at least one design involving also digital technology. The focus of these patterns is on the initial phases of social interaction — encouraging and enabling the encounters.
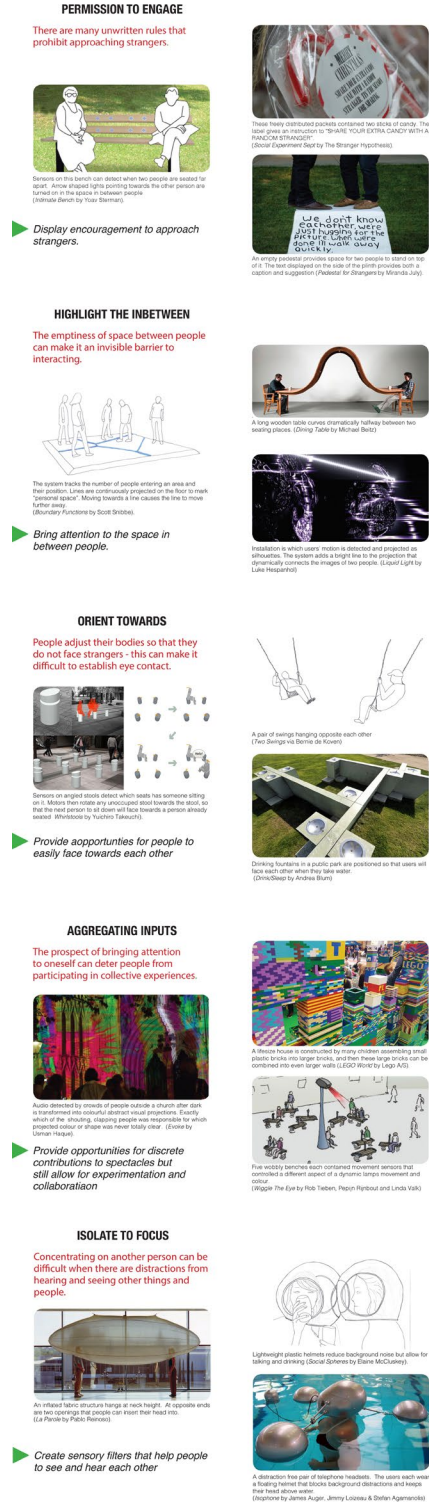
Figure 1. The five cards discussed by participants. Photos (from top left) ©Yoav Sterman, ©Barbara Ng, ©Olivia Jaffe, ©Yuichiro Takuechi, ©Klaus Stoebber, ©Michael Beitz, ©Luke Hespanhol, ©Usman Haque, ©Robb Mitchell, ©Rob Tieben, ©Pablo Reinso, ©James Auger (line drawings replace photographs in lieu of missing image reprint permission).

4.1   Permission To Engage

Intimate Bench by Yoav Sterman

This furniture has the form of a typical park bench, but features embedded sensors and various shapes of LED lamps discretely mounted in the backrest. The sensors detect where people sit on the bench. When two people are seated far apart, arrow shaped lights on the backrest turn on. These illuminated arrows point towards the other person. When people are sitting close together in the centre of the bench, red heart shaped lighting appears either side of them on the backrest [18].

To some respondents, the arrows on the LED bench backrest were just background visuals and thus too easily ignorable to have any impact on behaviour. Others thought it would have a negative impact. The critics saw it as as a kind of hidden trap or trick which "threw people into a situation" that they were not looking for. It was also suggested that the first person to sit down might worry that the second person might judge the first to be "in on the trick" and controlling the lights themselves. Some interviewees saw the surprise springing aspect more positively, speculating that once illuminated, the visibility of the LED arrows dissipates responsibility for making a friendly approach. They saw this as beneficial not only in relation to how a fellow bench sitter may evaluate them, but also for how the arrows communicates to bystanders or passers-by that they are behaving more friendly as a kind of playing along with the bench, rather than on their own initiative.

Social Experiment Sept by The Stranger Hypothesis.

Design experimenters prepared special packets of candy to hand out to pedestrians on a Singapore shopping street. The transparent bags each contained two sticks of candy and the label sticker displayed a seasonal greeting and a request to

> "SHARE YOUR EXTRA CANDY WITH A RANDOM STRANGER"

Thus shoppers receiving the free sweets were encouraged to give one of the candy sticks to someone that they did not know [59].

The stunt distributing candy bags received mixed reviews too. The seasonal theme of the intervention was mentioned as a positive quality by several interviewees, and the concept was agreed as "cute" by one focus group. However, others criticised the design on practical grounds. Principally, how the size of the instruction labels meant that it would be hard to persuade people to take the candies because potential recipients would not be able to read and thus understand the intentions of the intervention.

Pedestal for Strangers by Miranda July.

This platform was exhibited outside various museums as a part of the "Eleven Heavy Things" series of steel-lined fiberglass sculptures that invited audiences to pose with them and thus create a brief performance. *Pedestal for Strangers* is a truncated rectangular pyramid with a low height that means that it is physically easy for most people to step up onto its upper surface. The platform is designed to hold two people, standing close together. The handwritten styled text inscribed on the side of the pedestal read:

> "We don't know each other, we're just hugging for the picture. When we're done, I'll walk away quickly" [14]

This provides a caption for anyone or anything that chooses to stand on this plinth. This text thus indirectly and humorously provides the suggestion for people unacquainted with each other to share a hug on the platform .

This example received the least positive comments. Although the concept was considered original and clever, it was criticised on grounds like it was "just a game about getting close", and many considered that hugging strangers was a step too far for most people under almost any circumstance. Several interviewees suggested that alcohol consumption would be necessary for two strangers to get on the plinth together. Others mentioned that this would not help shy people at all since fulfilling the caption of the pedestal was very much like a performance. It was also mentioned that practically it would be hard to start this interaction with a stranger because initiating platform sharing might mean waiting on the pedestal alone. Being seen to be alone on the plinth would also be in contradiction to the inscription on the platform, and thus might underline the fact that they were by themselves - literally making themselves more prominent.

In sum, these examples were evaluated as more like providing permissions to *perform* rather than fostering low-key encounters. These designs require unorthodox behaviours and although they provide excuses for interaction, these were generally judged as not providing strong enough motivation to act unconventionally and overcome the barriers that inhibit initiating interactions with strangers

4.2   Orient Towards

Two Swings via Bernie de Koven.

Play advocate Bernie de Koven drew our attention to this pair of swings hanging opposite each other in a small public outdoor area in Amsterdam [16]. The swings directly face each other, but at a sufficiently safe distance so that they do not have any chance of collision. The upper parts of the chains that suspend both swing seats are loosely connected to a similar point on the corresponding chain of the other swing. As a result, motion of one swing influences the movement of its counterpart. However, lacking information as to how subtle this influence was, our study respondents were presented with a simplified version of this design which just described how the swings were positioned facing each other.

Interviewees also viewed this very positively. Its functioning was considered obvious and straightforward to potential users, and so it was not viewed as manipulative. Several commented that it was a "fun setting" and a shared activity ("both doing the same thing at the same time"), and that the lighthearted activity of swinging was important to setting the mood for a possible social encounter: "If an adult sits they are making a statement, I am available to play, available to have a chat". Another respondent told of their experience with a similar set up to argue for the social utility of this design. They recalled a playground from their own childhood in which there was a series of swings installed in a big circle facing each other "and so you would interact with the other

kids". One interviewee thought the design was positive because it gave the option of sending a signal concerning sociality "you can sit facing another one or you can swing in the opposite direction". Another aspect praised was the open-ended nature of the activity – "you can just try out the swing for a moment, or you can choose to sit there for a long time". Related to this was the mentioning of the comfort enabled by users being able to "monitor" the other user and so they could appropriately adjust or depart from the encounter. A potential weakness of the design mentioned by one respondent was how a safe distance between the swing seats might make it hard to interact much with a fellow swinger positioned opposite.

Drink/Sleep by Andrea Blum.
As part of a large sculptural installation in a riverside park, a set of eight drinking fountains was mounted on labyrinth like concrete walls. Each fountain had multiple waterspouts around its basin, and the fountains were positioned on the waist high concrete so that nearly anyone who bent over to drink, would face towards another person also bending over to imbibe [11].

This installation provoked milder reactions than the swings and stools. The openness of possibilities for interacting with it, and potential relative positions and actions of other fountain users were mentioned as attractive features by several, e.g. "I can choose direction of approach and how close". But also this flexibility was mentioned as reducing the likelihood of fostering new encounters. Others pointed out that it might increase awareness of other people but using a drinking fountain keeps one's mouth busy: "you are facing each other, but unlikely to talk". One architect stated that without the walls the design would be more social as there would be less chance of unpleasant smells resulting from public urination that would deter people from approaching or lingering. One of the younger interviews saw the positive value of the walls functioning as a barrier so that people could be "together but separate". Another though thought it uncomfortable to face strangers whilst drinking: "I would rather wait for people to go away".

Whirlstools by Yuichiro Takeuchi and Jean You.
This is a design concept for an urban kinetic seating system. Unlike the purely physical *Two Swings* and *Drink/Sleep*, this furniture is mechatronically dynamic. A number of stools are spread 1-2 meters apart in a public space. The surface of each seat is slightly angled so that it is more comfortable to sit in the downward direction that each seat slopes. Each stool is fitted with proximity sensors and servomotors. The sensors detect which seats have someone sitting on it. The motors then rotate any unoccupied stool so that its seat is angled towards the occupied. This is hoped to substantially increase the chances that the next person to sit down will face towards a person already seated [58].

For our respondents, the description of how this design functioned was not clear enough, but this frequently resulted in a discussion of different possible variations of the design. Several interviewees initially misunderstood it and this provoked a strong reaction. They thought that the occupied seats were rotated to face each other (rather than the unoccupied stools). Such a mechanism was considered very negatively: "imposing a behavior", "over-manipulative", and "too forceful". After clarifying that it was only

the empty seats that turned, respondents were much more positive. "You would quickly understand how it works, and then you are free to decide to play, or not". Several saw great potential for this concept to be implemented – particularly in places such as a university or concert hall where people are "there for similar reasons". Others pointed out that distances between stools were crucial to whether it might foster new encounters — too close and you won't sit near a stranger, but too far and this will make it difficult to start interacting.

In sum, designs that offer activities in which users orient towards each other may have potential for fostering encounters. However, open-ended, activities such as resting or swinging are more promising than briefer actions such as slurping. Furthermore, unwitting manipulation of users into facing each other was strongly criticized.

4.3 Highlight The In Between

Boundary Functions by Scott Snibbe
This was an interactive floor projection driven by an overhead camera tracking the quantity, position and movement of people who walk onto the floor. The projection is dark until more than one person enters. When the camera detects two people, a simple line is projected, thus dividing the floor into two separate zones that continuously change in size as the two people move about. With each new person that enters the projection area, additional lines are projected that dynamically mark a "personal space" around every visitor[57]. In video documentation (e.g. [67]), many visitors can be seen trying to touch a line with their foot, but the system responds sufficiently rapidly so that moving towards a line merely causes the line to move further away. If two visitors touch, by e.g. holding hands, then the projected line that separates them disappears.

Interviewees were fairly positive about this installation. The openness, playfulness, simplicity and subtlety of the interactive projections were some of the positive qualities identified. However, it was also suggested that people are likely to look more at the floor than each other. Some saw this as supportive of getting to know unfamiliar others because e.g. "it is more comfortable to be with strangers when you have something else to look at" whereas others viewed this aspect as less possibly detrimental to fostering new encounters. This criticism was explained as not specific to Snibbe's work, but rather that any digital visualization can be a distraction that takes attention away from co-present others. In this regard, the minimal projected lines of *Boundary Functions* was praised as being more effective than more complex and energetic visuals that interviewees had previously personally experienced in various art installations.

Dining Table by Michael Beitz.
This is very long wooden table that has been stretched upwards in its middle. The surface curves dramatically up and down between two normal ends, so that the tabletop has the profile of an over-steep humpbacked bridge. The meter-wide table rises up to over 2 meters in height. Thus a pair of dining companions sat squarely at opposite heads of the table would have their view of each other blocked by the vaulting surface. However, they could be mutually

sighted if they sat off-center. The height of the table means people can freely walk under the center of its arching span [9].

This was largely considered as unhelpful for fostering new encounters. Many interviews pointed out that the arch of the table surface acted very much like a visual "barrier", "block" or "obstruction" between people sat at opposite ends of the table. Some suggestions for increasing the likelihood of initiating new interpersonal relations around this kind of furniture included adding some kind of remote control cars or train that could take messages over back and forth over the hump, or using the table hump as an explicit barrier to separate players of tabletop board games such as "Battleships".

Liquid Light by Hespanhol, Sogono, and Wu.
This was an interactive digital installation where a depth camera captured audience members who walked in front of a large screen. The projector displayed a participant's body as a glowing outline or "auras", gliding on a visual representation of a dark liquid surface. If the camera detected more than one participant, then the projection drew vivid lines to connect each person's aura [29].

Similar to their concerns about the horizontal projections of *Boundary Functions*, interviewees were concerned that participants would focus more on the vertical surface projections of *Liquid Light* rather than fellow participants in the event. For instance, although the connecting line on the visualization "might momentarily lead to giving attention to the person linked", several respondents felt that this was of too brief duration to support a new social interaction. In a similar vein, another interviewee suggested that although the visualization might provoke a moment of eye contact, the screen did not enable "getting an extended response from the other". Another participant was more positive in seeing the projected image "creating a moment of wonder" in that the visualized connection would be manifested regardless of if users interacted with each other or not. The size and distance to the screen were identified as important parameters in determining whether this design might have any positive effects on supporting new encounters. It was pointed out that if participants needed to be physically quite close in order for the camera to track them, then this was unlikely to attract pairs of strangers.

In sum, the two digital examples of *Highlighting the in Between* were praised for their playful features with easy to understand behaviors that could support the development of an encounter. Also, unlike the *Dining Table*, the ephemerality in time and users' high level of control over the digital outputs were considered promising for fostering an encounter.

4.4 Aggregating Inputs

Evoke by Usman Haque
A very powerful projector illuminated the exterior of a large church in York, England. Vivid, abstract patterns illuminating the historic architecture were dynamically controlled by sounds produced by members of the public gathered in front of the church after dark. The system was sensitive to differences in cadence, rhythm or cadence of detected sounds. This inspired much experimentation by the crowd who explored the different effects of their clapping, stomping, and vocalizations both skillful such as singing, and

unrefined, e.g. whooping and hollering. When the event was busy, exactly which of the noise making folk was responsible for which color or shape was never totally clear [55].

Respondents judged this set up very favorably. One explained it in terms of loosening inhibitions because of the way it "allows people to drown in the environment". Another said that the darkness and scale of the setting meant audio inputs provided a "quite anonymous" means of participation, but that being part of a noisy crowd was an enjoyable experience that people recognize from other contexts such as sporting or musical events. Several respondents commented upon how the openness of interaction possibilities with the projection could help make a social atmosphere. One interviewee pointed out that an aspect of this was how one could easily disengage from participating, without being noticed or needing to give a reason, and this might make people more comfortable with inputting to the projection. Following on from their earlier comments about moments of stillness in dance improvisation, one interviewee asked whether, if and how this system would respond to collective silence – wondering what kind of projection could be displayed when there was no audience present? Another participant made a different point regarding the absence of a crowd in front of such a work. They pointed out that joining in with a crowd might be quite easy, but the very first people to arrive at such an installation might feel reluctant to be very noisy.

Wiggle The Eye by Tieben, Rijnbout and de Valk.
Five wobbly benches are positioned around a kinetic lamp post in a secondary school yard. Each bench rested on standard durable playground equipment springs. Within the seat of each bench were motors and sensors. The design researchers explored various configurations of mapping wiggle motions detected in one bench to output as vibrations in one or more other benches and also different ways that movements of the seats would influence the dynamic behaviors of the central lamp [62]

Interviewees were fairly skeptical about the desirability of deploying this design out with a school playground. Objections were principally in relation to the witting-ness of interactants and whether adults had sufficient "curiosity" or "playfulness" to explore the potential of the concept. Several interviewees said that interacting with the lamp might feel like a "trick" was being played, if you sat down without realizing that you were controlling a lamp. Similarly, one respondent suggested that it was "a bit scary" that just sitting on a bench could control a light. Another questioned whether the act of adjusting how one sat was very social as an input mechanism, and that the benches were too far apart to enable beginning a conversation.

Wall building at LEGOWorld by LEGO A/S
Plastic bricks were provided at a number of different tables, in one small area of a gigantic construction toy fair held in a convention centre's exhibition halls. Children could choose colors of small bricks to assemble into larger bricks. These larger bricks from different children could then be connected and stacked not to top of each other to make life size brick walls (author observation).

This example was disliked as much as it was liked. Interviewees praised it for reasons such as "providing for creative choices" and "more a sense of building something together" rather

than doing something for the immediate feedback received. Others disagreed as they prioritised being part of an experience, rather than contributing to something that soon becomes quite static and disconnected to their input. This LEGO brick construction opportunity was also criticized for seeming "too organized". For instance one respondent pointed out that children were only assembling bricks because there were some adults present to encourage and guide the activity. Another suggested that the success of such a set up is probably determined by how it is part of a major event in which "everyone is there to build".

In sum, both unwitting participation and over-organised facilitation of a shared activity was judged more negatively than an open-ended shared experience in which it is possible to be present and decide if, how and when to actively contribute – especially if participants can influence how much attention collocated others might give them. There seems to be a need to get the collective action somehow started. Joining an ongoing activity is easy for an individual but proactive and exploration-oriented individuals are needed to create a setting.

4.5 Isolate To Focus

La Parole by Pablo Reinoso.
An inflated fabric structure, shaped like a zeppelin was hung at shoulder height in several museums. This semi-opaque "balloon" was 6.2 metres long. Electric fans continuously pumping in air maintained its form. At both ends of the underside of the structure are two openings that visitors can unzip and insert their head into. Although the bubble is semi-transparent and its thin textile does not offer any soundproofing, within the quiet of the museum, the structure gives a feeling of isolation and thus focus towards any other person whose head is inserted [5] [20].

Several respondents found this piece very powerful. For instance, stating the form "creates a compulsory eye contact" or "enforces a sense of connection". One participant observed that the structure is likely to have acoustic effects and thus through distorting the voices of visitors could give them something to talk about: "this sounds weird in here". Although they reported seeing the benefits of what one interviewee called an "almost mandatory need to communicate visually" several interviewees wondered why the interaction was just about the heads. They felt that missing other aspects of social interaction such as body language could be detrimental for getting to know someone. Furthermore, although the shape of the inflatable was called elegant or beautiful, it was pointed out that from the outside the form increased attention to the physical appearance of a users' body. That is, the headless body was prominent, and observable to bystanders in a non-reciprocal fashion. One interviewee said that although inserting a head was gaining one kind of privacy, it was at the same time, a kind of performance that might attract unwelcome attention, and thus deter participation - particularly in a spacious room like a museum. In particular, unless two people inserted their heads at exactly the same time, the body of the first person to "enter" the headspace was highly visible, and thus appraisable to any mutually present potential interactant. One positive aspect mentioned by one participant is that they thought strangers could be comfortable

being together in this structure because the interpersonal distance between two users could not be "too close".

Social Spheres by Elaine McCluskey.
These lightweight, plastic helmets aim to reduce background noise experienced by conversationalists in busy bars or nightclubs. The spherical headwear is transparent and features circular openings on its front and sides. Because of these orifices, dyads of wearers, whilst speaking, may position their helmet's mouth openings next to that of one of their partner's ears. And then, when their partners are speaking, positions may swap so that the gap between their ears and their partner's mouth is similarly shielded from noise in the environment [8].

Although excessive background noise in clubs and bars was agreed to be detrimental to developing new encounters, interviewees did not receive very well the gold fish bowl-like helmet design. The bulky nature of the headwear was considered too awkward for interacting comfortably. Several commented that this headwear appeared too restrictive in terms of things like not being able to adjust interpersonal distances, and not being able to "turn head away and keep talking". Participants suggested that such physical constraints would reduce or remove too much non-verbal aspects of conversation. Another interviewee feared that the helmets might lock with each other and thus strand people in unpleasant or unwanted encounters. Another respondent questioned the design on the practical grounds of "this will only work if everyone has one", and wondered if it might just be "easier to turn the music down".

Isophone by Auger, Loizeau & Agamanolis
In a pair of flotation float tanks, a pair of audio-intercom headsets rest on the surface of water. Each user wears one of these opaque soundproof helmets that block both audio and visual interruptions. Each helmet is connected to a trio of floats that provides buoyancy sufficient to keep both headset and users' heads above the water line. The water being heated to body temperature further increases the isolation of each user. This immersive experience is designed to deliver highly increased concentration on any conversation conducted between the two floating headsets [6].

Isophone was thought also to be rather unwieldy. For instance one respondent mentioned that changing into a swimming costume in order to chat was a bit troublesome for most people. Participants seemed to feel this design example was too extreme and thus gave it much less attention than *Social Spheres* and *Parole*. One interviewee suggested that the isolation of its users from everything apart from an audio connection was not helpful as it removed "that common thing to talk about". Another said that being isolated to such an extent would "freak them out" too much.

In sum these designs provide a playful context for shared focus but, again, little encouragement to do so or guidance on how to proceed e.g. what to talk about.

5 DISCUSSION

Responses to the candidate patterns suggest that the patterns could be arranged to correspond with the different stages of Ludvigsen's framework [40]. Namely, both *Orient Toward* and *Highlight The*

Inbetween may potential facilitate changing a situation from one of "distributed attention" to that of "shared focus". *Permission to Engage* could possibly signal an opportunity for "shared focus", and ease the transition from "shared focus" to "dialogue". *Isolate To Focus* might be helpful in transitioning a situation of "shared focus" into one of "dialogue" and *Aggregating Inputs* might facilitate "collective action" that may also result in "dialogue". However, such a mapping is only firm concerning a *potential* beneficial effect on developing encounters. Ludvigsen's framework can also clearly be used to identify and explain a principal critique of the design examples. That is, much participant criticism could be summarized as an aversion to the act of actually starting to shift upwards through Ludvigsen's levels.

Almost every respondent mentioned the potentials risks of initiating interaction with strangers. In the following, we unpack further this risk of transition and suggest three design principles that are inspired partly by CSCW ideas concerning interpersonal saliency, attention and perceived responsibility. For supporting collaboration, Erickson and Kellog presented the influential concept of designing for translucence [22]. They suggested that social computing systems should share characteristics of "visibility, awareness and accountability" which in the physical world also support people in communicating, and explicitly drew attention to why they promulgated social translucency rather than social transparency as a design quality, arguing that varying degrees of privacy or awareness are necessary for different social actions. We would argue that designing technological support for initiating collocated embodied encounters may benefit from similar close attention to translucency.

Psychologists have argued that when two non-acquainted people interact, a priority of both is coping with several unknowns—the partial amount of information each has about the other, and not being able to anticipate how the encounter will unfold [19]. In other words: "their primary concern is one of reducing uncertainty about the other" [10]. This aspect can be seen in how interviewees were more favorable to projects like *Evoke*, *Two Swings*, *Liquid Light* and *Drink/Sleep* in which users may gradually adjust the progression of an encounter. Moreover, by contrast, this disposition can also be seen in the vehemently adverse reactions towards *Whirlstools* when interviewees initially misunderstood the concept as occupied seats being automatically turned to face other occupied seats.

The initiator of an encounter with strangers is opening themselves up to additional risks than those experienced by the recipient of an initiation. In some circumstances, there may be a risk of physical danger. However, in such situations, potential initiators of interaction are unlikely to be seeking an encounter. Far more pervasive is the perceived threat of psycho-emotional unpleasantness. That is, the person making the first move (whether literally or metaphorically) to commence an encounter is placing themselves in peril of various unpleasant emotions mainly connected with perceived or actual negative reactions from others.

Primarily the reluctance to initiate many desired encounters is inhibited by the prospect of negative reactions by prospective interactants, but the potential adverse judgement of any bystanders also plays a role. Laurier and Philo listed how trying to start an encounter carries risks of being seen as "disrespectful, invading someone's privacy (in public places), soliciting, chatting up, conning or 'mad' " [37]. Potential initiators thus risk depleting their socially constituted sense of self-worth – what Goffman called losing face: "an image of self delineated in terms of approved social attributes" [66].

Thematic analysis of the interviews suggests three overall design principles for providing opportunities and support to mitigating the risks of losing face for users who wish to initiate interactions with unfamiliar others: automate the first move; deflect from the first move; and ambiguity of the first move. Each of these design principles is concerned with either reducing or removing the saliency or responsibility for initiating an interaction.

We are not claiming that these principles alone will produce social interaction where there is no mutual desire to enter an encounter. Rather we propose that contextually appropriate application of a principle may inspire designers to help users who have mutual wishes for an interpersonal encounter but are averse to the risks of initiating one. Our respondents are very well traveled and culturally diverse, but we make no claims for the universal applicability of these principles. Given the background of our participants and the locations of our study, we suggest that these principles are most likely to have relevance for less than fully-public settings in urban areas of more developed countries. Although as mentioned previously in 2.2, the range and impact of contextual factors on fostering new encounters cannot be overstated.

5.1 Principle 1: Automating the first move — Let the system or artefact take the blame

This principle suggests designers consider making an object or environment appear responsible for initiating any interpersonal encounter. Removal of responsibility from making the first move may thus prevent any initiators of unwelcome attempts at social interaction from losing face.

For example, in *Liquid Light* and *Boundary Functions*, two participants may find themselves sharing a projected line, in the former it is a line that connects their bodily digital representations, while with the latter, it is a projected line on the floor that separates them. Both these dynamic lines have been reported as increasing participants' mutual attention [29] [57] and can be seen as making an initial interaction between people. Interview respondents praised this kind of design as facilitating participants to share a connection, but without anyone having responsibility for initiating it. Since neither line will appear if there is only one participant, it could be argued that the second person to arrive in the camera view is initiating this connection. However, it may also be said that the first person to arrive is issuing an implicit invitation for another to join them and activate the projected line. This point can be illustrated with reference to the *Intimate Bench*. For this seating also provides a visual link between two people, and concerns were raised about whether the first person to sit down could be negatively assessed if they were perceived by the second person as having laid a visual "trap" for them.

This principle thus seems more apt for free-flowing social situations where people are standing up, rather than in situations where one participant can appear to take temporary territorial "ownership" of a portion of space through occupying a particular seat or table, etc. Furthermore, outsourcing the initiation of the first move does not mean that a social icebreaking intervention should come as a surprise. *Intimate Bench*, and *Wiggle The Eye* received some criticism for how they unexpectedly interfere with the everyday activity of relaxing on a bench. Here we have discussed the potential for a system to initiate an encounter through abstract visual means, but this principle might also be applicable for other sensory modalities such as haptics or audio.

5.2 Principle 2: Ambiguity of first move — Provide plausible deniability

Similar to Principle 1, this suggests providing opportunities for users to choose actions to improve chances of initiating an encounter. However Principle 2 differs in stressing to design for ambiguity concerning whether such choices were deliberate and socially oriented. This gives anyone attempting to initiate interaction a degree of *plausible deniabil*ity concerning whether they intended to initiate an interaction. Plausible deniability of presence or availability has been identified in HCI as a popular benefit of many messaging system features [47]. We use the term more in the spirit of Pinker's explanation of the utility of "indirect speech" [52]. Thus a cooperative recipient can accept a discrete request to interact, but if an invitation is not reciprocated, there are minimal adverse consequences for the initiator. E.g., respondents highlighted how social interactions initiated around *Evoke* can be very ambiguous regarding if, and who, any utterances are directed to. By contrast, stepping onto *Pedestal For Strangers* was criticized for leaving no chance to deny a wish for interaction or attention.

Parole was also praised for offering ambiguity concerning who was initiating an interaction. The first mover towards sharing the headspace can be said to be either the first or second person to insert their head. That the first occupant can only be seen partially and the second occupant's face cannot be seen by the first until their head is inserted means that neither or both participants are initiating the encounter. This design thus may support designing to be approached in that a shy person might be fairly comfortable being the first person to insert their head in an empty structure – indeed this actually offers a route to partially seclude themselves from strangers in the room. A user sitting down when *Whirlstools* are unoccupied might know and welcome that all the other stools will rotate to face them, but their hope for a new social encounter is not explicitly broadcast.

5.3 Principle 3: Deflecting from the first move — Increase other stimulation

Interactive design might lower some of the barriers lessening the likelihood of encounters commencing by bringing attention away from participants. Rich sensory settings may help with reducing the saliency of initiating an interaction through figuratively or literally removing people "out of the spotlight". Distracting an individual from self-monitoring [12] and giving other co-present people plenty to attend to may both reduce self-consciousness.

A common criticism of the *Isolate To Focus* examples was how reducing background stimuli could put more pressure on, and provided less "content" for conversation. The *Intimate Bench* was criticized for highlighting other users by literally pointing at them with LED arrows. In contrast, several of the installations were praised for enabling situations that were interesting irrespective of a social component, and this was considered to increase the chances of an encounter developing. For instance, *Two Swings* was praised for enabling a pair to undertake an individual activity in a style and for durations of their choosing. Several sensory modalities can be highly stimulated whilst oscillating on a swing. With *Two Swings*, this means the person swinging opposite is just one of many things a person can give attention to. That the activity may last a while gives participants chances to gather information [19] about each other, and thus reduces mutual uncertainty. Exploration of *Evoke* lasts a while too, but attention is less directly upon other people since the large projections are the main eye-grabbing element of the dark setting. Technologies such as interactive multimedia, shape-changing artifacts, and dynamic materials offer many opportunities for increasing richness of stimulation to shift direct attention from if and how someone initiates an encounter with collocated strangers. However, care should be taken when designing to foster new encounters not to create a sensory overload that may make it more difficult to commence an encounter. Rather configurations should be designed that provide attractive options for initiating interpersonal interactions amongst or through the sensory richness. The popularity of the social shadow play afforded by some of Lozano-Hemmer's works [56] shows that interesting social effects can result from the simpler aspects of more complex systems. In some kinds of crowds the presence of bystanders can be disinhibitory – as a fictional character once exclaimed: "I like large parties. They're so intimate. At small parties, there isn't any privacy" [23].

6 CONCLUSION

This paper examined five candidate inspirational design patterns for fostering social encounters through a series of interviews and discussions. The contribution is largely theoretical and conceptual because the evaluated data is quite preliminary in terms of width and depth. However, we would argue that studying the design examples and responses provides useful insights and enriches discussions for addressing the challenge of designing for social icebreaking. Furthermore, analysis of participant responses yielded three novel principles regarding *automation, ambiguity* and *deflecting* for countering or offsetting some of the potential social and emotional risks that may deter people from initiating an encounter. We hope to inspire designers with these findings but stress that they are not a replacement for careful consideration of understanding contexts and target users.

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