Searchable Objects:
Search in Everyday Conversation

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ABSTRACT

This paper examines mobile internet search, presenting search not as a process of information retrieval, but as part of conversation and talk. Through video extracts of mobile search we explore how mobile phones are interwoven into talk, and how searchers manage the participation of other conversationalists alongside the search itself. We introduce the notion of a 'searchable object' – an object that arises in conversation that can be searched for online – and document how such an object occasions a search. In turn we discuss the differing roles of the device 'driver' and 'passenger', and how participation is managed through questions and narration. Rather than search being solely about getting correct information, conversations around search may be just as important. We conclude by critiquing some of the pessimistic views of interaction around mobile phones and their use in ordinary life and talk.

Author Keywords

Collaborative search; mobile; phone interaction; video analysis

ACM Classification Keywords

H.5.2. User Interface

INTRODUCTION

In this paper we examine how search is used in conversation, in particular collaborative search [15]. We follow the example of how *forgetting* is used in talk put forward in Chuck Goodwin's paper "Forgetfulness as an interactional resource" [7]. Here, Goodwin presents the argument that forgetfulness can be something more than just a cognitive impairment. The paper starts with an extract of a conversation in which, while telling a story, a speaker forgets the name of a guest who had appeared the previous evening on a television talk show. This prompts the other parties to the conversation to give suggestions for the guest's name. In his analysis of this clip, Goodwin shows how forgetting is used by the main speaker to change the participation of the listeners to his story: "a display of uncertainty provides resources for [...] rearranging the

structure of the current interaction" [7, p128]. Forgetting – in interaction with others – lets the speaker talk in ways sensitive to the presence of parties who might already know the story being told, who can be included in the telling by giving them the opportunity to aid the speaker's memory.

The prominence of mobile phones, and the ability to quickly conduct searches in the presence of others – 'collaborative search' – appears to be a frequent occurrence, with some reports that collaborative search accounts for as much as 63% of mobile search [21]. Internet searches that arise in conversation are now a grossly observable feature of everyday interaction. Yet while this searching is commonplace, we have little data on how this searching is arranged, how it influences conversation, and how we might design search to take into account its conversational role. Indeed, current narratives around mobile device use have followed a somewhat predictable path of critiquing the potential for distraction, cognitive impairment, and damage to our social lives with others – e.g. [13, 22].

Yet Google is changing our everyday conversations. Through close examination of videos of collaborative search we document how search is connected with and used in interaction with others. We discuss how mobile collaborative searches are 'occasioned' by the surrounding talk or environment. Searching at a particular point in a conversation is not random but dependent upon having something that can be searched for – a *searchable object*. We go on to document how narration and questioning are used to manage participation, how search results format and influence conversational sequence, and talk is structured into candidates and evaluation slots. As with Goodwin's example of forgetting, during search the participation of those present is managed through narration, questioning and following the given structure of search results.

This close examination of search leads us to engage with a crucially important question: are mobile devices – and activities like search when conducted in the presence of others – actively changing or even damaging our conversation and interaction? We attempt to understand this relationship and feed this back into the design of search, to understand how search applications could be aligned not just for the efficiency of information retrieval but to support their role in interaction with others. More broadly we document the implications of interactional research for understanding the role of mobile devices in our daily lives and interactions with others – distracting or engaging, detrimental or advantageous.

RELATED WORK

Search has been extensively investigated as both an individual, and more recently, collective activity [1, 2, 17]. One early concept was 'information foraging' [17], clearly encapsulating the notion of an individual searching for and evaluating different results to a search. Information foraging explains how search is organised so as to satisfy the need for information, with a tradeoff between conducting further searches for information, and the declining returns of further search. 'Collective search' more broadly is search involving others, including cases where searchers are co-present with each other. Teevan et al's [21] survey of mobile search users reported that 63% of incidents of mobile search took place in a 'social context' and were discussed with someone co-present. Collective search has come to the fore in part because of the growth of mobile search and the increasing support that mobile device interfaces offer for such search. Morris conducted a survey based inquiry into collaborative search, identifying high amounts of co-located web searching, with as much as 93% of smartphone owners reportedly engaging in co-located collaborative searches [17]. In terms of design, Amershi's [19] paper introduces some useful concepts around co-present search, while Amini focuses specifically on mobile search [1]. Church and her colleagues [5, 6] have discussed the different types and uses of mobile and social search, using diary and interview methods.

Much of this work has reviewed search behaviour broadly, however we have little detailed understanding of the moment by moment involvement of talk and search. In particular, how does conversation and interaction interface with search? We began to investigate this in [4] where we used video data to examine co-present mobile device use, including search. Giving pairs of users a single, instrumented phone around which to interact and recording a day of data as the participants explored a city (figure 1) we noted that projected location was an important factor in the initiation and content of social search.

We situated this in the controversy around co-present device use. A series of debates have developed around the argument that this use of devices in the presence of others (such as in conversation, while driving [11], or during
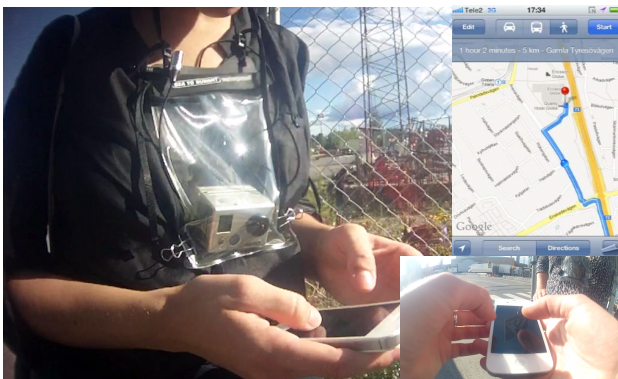
university lectures [22]) is distracting or even alienating users [13] – mobile devices portrayed here as machines which are increasingly drawing us away from our valuable presence with others [20]. As a contrasting view Whittaker *et al* discuss 'Information Curation' [25] that can be seen as a social use of mobile computing where familiar information is used as a personal resource to be kept, managed, and exploited in every day life, supporting claims that mobile phones can bring us closer to our families [24] and friends [12]. While these debates are perhaps recognisable to any witness of the growing use of mobile devices, there is something of a paucity of data. How is our interaction with others influenced by mobile device use? While this paper focuses on search we can also use our data to inform these debates.

METHODS

One inspiration was Moore et al [16] and their use of video analysis to look at search, drawing on the notion of 'third position repair' to explain how search enquiries follow a sequence of specification of search terms, followed by results, followed by a further re-specification of search terms. Could mobile search be examined using video recordings of *in situ* search? Close attention to relatively small number of recordings of search would lack the easy generalisability of the quantitative data usually deployed to inform search design. Classically, bucket tests provide strong evidence for the superiority of particular search approaches over others, and have been fundamental to the refinement of search among major search engine designers.

Yet we felt that video data provides the opportunity to generate more fundamental understandings of what is going on in the search process – not just improvements in queries but how and why particular search results might be conducted. This is particularly the case in mobile situations where both the search situation is less well understood, and where there is the potential for the context to be more varied and to play more of a role in the search itself. Video recordings have been one longstanding method used for a range of different analytic purposes, but particularly to document interaction with and around technical artifacts [9, 23]. This research has extensively studied interaction around screens, capturing on-screen interactions as part of ongoing complexes of work practice (e.g. [10]). Video has proven valuable in illuminating aspects of activities neglected by previous methods, particularly drawing on conversation analysis to understand technology in use. In some senses video forces attention on the moment-by-moment production of technologically mediated action.

Accordingly we used a relatively lightweight video method that made use of wearable cameras, combined with iPhone screen recording software. This method allows us to gain something of a new perspective on mobile device use and, importantly, lets us study in detail how the environment and device are connected during search. Our participants wore multiple portable wearable cameras that recorded their actions relatively unobtrusively (figure 1). These videos were combined with phone screen recording software to allow us to unobtrusively capture the onscreen use of mobile phones. We combined this with experimenting with

Figure 1: Participant is wearing camera in map bag around her neck. The left picture is taken from one wearable camera, with the image from the iPhone recording and the second camera on the right.

studying multiple participants together, each wearing portable cameras from which to capture multiple viewpoints of device use, resulting in video recordings of the device user (from their companion) alongside video recorded by the device user, a recording of screen use and an audio recording of everything said around the phone.

We collected a corpus of video recordings of phone use involving participants asked to spend a couple of hours enjoying a 'city daytrip'; in total 20 participants (14 female, 6 male) took part across 13 sessions in Stockholm and London, including 9 locals and 11 visitors. All were iPhone users recruited via advertisements in local cafes, visitor websites and social media. All participants were fluent in English and we asked them to interact in English - though some switched to other languages at points during their daytrips. With one exception, all sessions involved two people, both wearing small cameras and one person leading the iPhone use. A researcher accompanied a single participant in five of the sessions. Otherwise, remaining participants were set up in pairs, with equipment and sent off without the researcher.

In earlier work we have reported more generally on the use of mobile devices in interaction during city visits from this data, documenting map use, and co-present interaction around the device [4]. Our goal in this work was not to provide a statistical breakdown of the uses of the mobile device. In many ways this is already well catered for in the existing log-based literature. Rather our goal was to better understand the details of particular situations of use. One researcher watched all 24 hours of video data and flagged clips that included search. This resulted in 205 one to two minute clips which were then used for focused analysis in group data sessions. These clips were used to generate analytic concepts which we then looked for in the other search relevant clips. We focus on cases of mobile collaborative search – naturalistic examples of search which took place on users' iPhones while they were participating in our trial. Our analysis involved in-depth examination of the clips looking to understand the different resources individuals brought to bear on the interaction and use of technology. As is often the case with data of this kind, the presence of groups in the data let us examine how their analysis of the situation echoed our own interpretation of the data. Here we focus on three incidents which most succinctly illustrate our broader analytic themes; each clip features different aspects of how search is done in conversation, but also some of the variety in how search is interlaced with conversation. In the first clip we see how search can be occasioned by a topic that comes out of conversation. In the second clip we look more closely at how the participation of others in the search is managed by the searcher. Lastly, we look at how decisions are jointly made around searches. Each clip also illustrates a different type of search – using Google in the first clip, the iPhone "Yelp" app in the second, and lastly through navigation and discussion around a website's contents.

RESULTS

In our first clip two participants are walking around a museum exhibition together. This clip lets us introduce

three important aspects: how conversation works to occasion a search, the introduction of what we call a "searchable object", and how 'drivers' and 'passengers' work together to manage the search. Note how the search terms come from both participants:

The first transcript (Figure 2) begins with a preamble before the search where discussion is sparked by an observation about one of the displays.

Transcript Notation: Participant A takes the role of 'driver', i.e., they hold the device. Participation is highlighted by ▇ when only A is looking at the device, ▇ when only B, and ▇ when both. ↑ = rising pitch, (.1) = a timed silence or . short break, colon = exte:e:nded syllables, [*] = image included.


```
A: He's (.) he does like to stand behind.
   He's gonna get pooped on if he's not
   careful
   ((Participant points to exhibition signage
   which illustrates the relative size of the
   prehistoric animals in the museum by using
   diagrams of them standing beside a human
   form. It looks as if the human is standing
   directly behind the animal.))
B: Have you se:e:en that footage of the guy
   in the zoo and he's cleaning out the
   elephant pen (.) and he's sweeping and the
   elephant reverses and his head goes up the
   elephant's ass↑ [*]
A: Heh heh ha ha
A: Is that online?
B: It's on YouTube.
A: That we have to find.
A: Right eh. Search (.) What do-what do we
   search for?
A: Elephant arse man.
B: Uh yeh. Elephant head (.) elephant ass
   head [Hhh heh heh]
A:      [Hhh heh heh] (9s)
A: elephant man head arse
   ((A taps in 4 worded
   search to YouTube))
A: Hey hey there you=is
   that the one?
   ((B points to item in
   results listing)) [*]
B: Yep that'll be it.
```
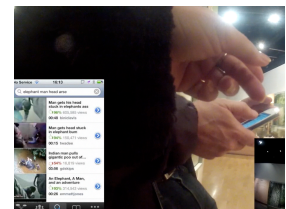
Figure 2: Searching for elephant video

The search starts with a `"have you seen"` sequence. This is arranged in the form of two 'stories'– first a very short `"he's going to get pooped on"` remark about a sign in the museum that the two friends are visiting. This is followed by the description of a video of a reversing elephant. Clearly this elephant story doesn't come out of nowhere, but is linked to the illustration on the sign and the first friend's remark. As Sacks [18, vol ii p764] points out, these 'second stories' often get proceeded by questions like: `"have you seen"`, that act to introduce the second story in a topically connected way, and also to set up a possible next action (go and see this video).

Occasioning Search: Searchable Objects

With a smartphone it is possible to pull it out and do a search at just about anytime. Why then is the search done here? One of our key questions was what *occasions* a search– what is it that makes an internet search a reasonable thing to be done at *this* point in time? This can be broadly described in terms of how a conversation 'occasions' the search. That is, the way in which a conversation proceeds that sets up the situation where the all elements required for a search are present – although whether a search is actually conducted at that point is a matter of circumstances and decisions of those involved. The usage is not triggered by the conversation, but becomes a relevant thing to do.

```
B: Have you se:e:en that footage of the guy
   in the zoo and he's cleaning out the
   elephant pen (.) and he's sweeping and the
   elephant reverses and his head goes up the
   elephant's ass↑
A: Heh heh ha ha
A: Is that online?
B: It's on YouTube.
A: That we have to find.
```

Figure 3: Have you seen

One of the first things that seems to 'occasion' a search here is the question and answer sequence: "`Have    you se:e:en`" / "`That we have to find`". The first line is a recommendation of an unusual video, and with the YouTube app on the iPhone the video is available there and then. We might then suppose that questions could occasion a search. Yet questions and answers are an exceedingly common part of conversation and many of them seem to do little to encourage or occasion an internet search. More specifically in this clip the question actually produces something that is essential for a search – what we call a 'searchable object'. We can start to define such an object as something that can be found via a search – a video, the the case above, or an answer to a query, such as to the question "Is Joni Mitchel sami?" (as in one of our other clips). For a conversation to occasion a search of some sort it needs to provide such an object, however the presence of a searchable object is just one ingredient in occasioning a search.

It is possible to propose further constraints on what a searchable object might be, in that it needs to be something that could be searched for and found *at that point and time*.

If, for example, the conversation mentioned a television show then perhaps it would not be appropriate to do a search there and then and start watching the show. However, a clip from that show could be found, or details of that show (such as actors, episode names etc).

Here the video is an amusing clip that is short and can be watched there and then. One class of 'searchable objects' then might be those that can be searched for, found and quickly consumed; a fact, an answer to a question, a short video – these are 'searchable objects' in that they can be searched for and consumed there and then. The searchable object may be something stored on the internet (such as a video or song), or it may be something (like the answer to a question) which can be produced using materials found on the internet (such as a wikipedia page). We emphasise that the occurrence of a searchable object in conversation does not force or trigger the search. Rather the introduction of a 'searchable object' into the conversation provides a slot where a search can be performed relatively naturally (what we called 'occasioning' a search). Those involved might choose to search or not to search, of course, but that action is a 'relevant next action'.

The decision to do a search there and then has some possible dangers in an interaction, in that it might reasonably be a little frustrating for the person who does not have the phone to have their companion searching on the phone and then watching a video. They might, for example, wander off, choose to pay attention to something else or simply dis-attend to the search. This leads us to the second aspect of search: managing participation.

Managing Participation: Driver & Passenger

As in our introductory example, Goodwin [7] discusses the practice of managing participation by those telling stories where forgetting – and specifically the use of questions by the speaker – provides an opportunity to manage the participation of others in an activity – in that they reliably require an answer from the recipient, and 'involve' them in the story telling – or in our case, the search [8].

One of the challenges in using a phone when others are co-present is managing their participation so that they are not excluded from the activity on the phone. That is, when using a device how do you manage the participation of those who are present with respect to the device usage? At times this could mean excluding those co-present, but in the cases we look at here device users actively attempt to engage those who are co-present in the search itself.

A first point about the interaction is that there is something of an asymmetry in that one individual holds the phone and has direct interactional access to the device, whereas the other has only visual access (mostly), which is mediated by the individual holding the device. Drawing an analogy with studies of driver-passenger interaction we will differentiate between 'driver' and 'passenger' (as in [19]). Of course, the device can be passed from one individual to another, swapping the driver and passenger, but here these roles remain static.

```
A: Right eh. Search (.) What do-what do we
   search for?
A: Elephant arse man.
B: Uh yeh. Elephant head (.) elephant ass
   head [Hhh heh heh]
A:       [Hhh heh heh]
```

Figure 4: What do we search for

So in figure 4 the phone-using participant (the 'driver' - A) uses the YouTube app to search for the video, and what follows is a short discussion of the search terms. The question, "What do we search for?" is followed by a self answer of "elephant arse man", and then a list of terms produced by the co-participant without the phone ('the passenger'): "elephant ass head". The search query is a list of terms that are to be typed into the YouTube app. The choice of these three terms is interesting in that they are both minimally adequate for the search.

The search terms, 'elephant arse', 'elephant man', 'arse man' – could be ambiguous in that one can at easily conceive of videos that might be found instead. The listing of the three nouns (by both participants) summarises the supposedly amusing event caught on video: man (or head), elephant and the noun 'arse' (or 'ass') acting as the crux of 'the action' (see also [15]).

The 'driver' could have chosen to plug in the search query themselves, but the question and the short discussion act to bring the co-present passenger in as a minimal participant in the search. If the search fails, they might be called upon to supplement future searches. What is actually typed in by the driver is a mix of the search terms given by both participants: "elephant man head arse" – this mix displays 'listening to', and also the participation of, the non-phone holding participant. When the search results load the searcher then asks, "is that the one".

After the selection of search terms, the participants move to stand side by side, with one participant on a ledge and the second slightly closer arranging their participation around the phone, both with visual access to the screen but also the ability to interact with the screen and gesture above it. As the results are returned, and before the driver asks "is that the one", the passenger points at an item on the list of returned search results (image bottom right in figure 2).

One feature of a small device like a phone then is that it provides for the easy reconfiguration of a limited number of multiple participants around a screen, even while the small size does place some limits on visibility and joint interaction. In this case though the two participants quickly engage in 'joint interaction' and just as quickly disengage. It is worth noting that this configuration does not rely upon any furniture or special arrangements in the environment, just the movement of bodies, hands and eyes. After the video is found and loaded, both the participants face the screen and watch the video. After a minute or so of narration the video gets to 'the action' and we finally get to see the participants watching the video together (figure 5).

```
B: this is it
   ((YouTube video runs with continued
   narration for 40secs till video shows a
   keeper's head accidentally going up an
   elephant's rear))
A: oh:h:h:h ma:ate heh heh heh heh that is
   s:o:o wrong [heh heh heh heh]
B:            [sheh heh heh heh]
```

Figure 5: So wrong

As soon as the clip has played, the passenger moves away from the phone but both of them continue laughing together about the clip.

This first clip sets up some of the key things that go on when searching as part of a conversation. We talked about how a search is 'occasioned' – what makes an opportunity for a search to happen in the first place. Important here are 'searchable objects'– things that come up in conversation or interaction that can be searched for. During the search the driver 'manages the participation' of the passenger, involving the other participant in the search, through questions and the like.

Clip 2: Questions and narration

Now lets move onto our second clip (figure 6, next page). This time we get to see how search results themselves are used. In this clip, the 'driving' participant uses their phone to look through a set of results on the Yelp application (a local information site) searching for the term 'shopping'. The couple are looking for a new bag, although as we will see this leads to a search for shopping establishments. Here we can see how the participation of the 'non driver' is managed by the participant who is holding the phone. Unlike our first example, there is no conversation or interaction around the search term which is entered into the 'Yelp' app. Yelp is a website that lists local establishments and services, and it has a companion application that is used by the participant to see if they can find a suitable store. It is not until the search results are returned that conversation engages with the search.

What this clip does show quite nicely, however, is how the results of a search can be engaged with jointly in discussion with a co-present other. Here the two participants are facing each other over a restaurant table, so cannot jointly interact with the device. The phone can, however, can be passed over the table so that they can share the search results and information on the display.

As with the first example *managing participation* is one key aspect of talk around the device. Again we can see how questions are used, (what's a hobby shop) as well as narration, (there's mood shopping centre). Secondly, we will discuss how the timing of the interaction with Yelp is arranged in the conversation. Distinguishing this search from the earlier transcript, the two searchers here are also jointly deciding what they will do on that day. The inspection of different items is consequential, in that they will visit one of these places to look for the bag (I'm trying to find like where I might buy a bag). The 'searchable object', then, is a shop or set of shops where bags could potentially be purchased. Yet alongside
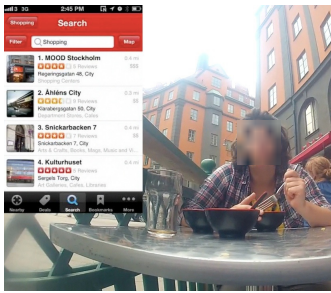
((A starts a search holding the phone under the table as she dines with her partner))

A: I'm trying to find like where I might buy a bag (.2) or where there like are vintage shops or-

A: There's mood shopping centre stockholm. (.) There's the <u>o</u>lens.

A: There's one (.2)

A: what's↑a hobby shop

B: trains↑

A: huh

B: trains

A: I don't think so.

A: The things it has are (.2) ((participant waits for page to download))

A: it's whole bunch of stuff ((A scrolls through pages and describes images))

A: like for biking (.) for backpacking (.) for making your deck, for your pool. Interesting↓ It's kinda like a homegoods store.

B: Okay.

A: There was one (.4) used vintage consignment-con<u>sign</u>ment place

B: yeh (.1) okay

A: But I think it could be more of a book store
((A selects Rönnells Antivariat again and waits for the page to load))

A: yeh, like used books.

B: Why do you say that?

A: It's not (.) It's like the third or fourth thing in its list of what it is, but I feel like it could be the

B: The first thing it says is books↑

A: No it's like the fourth thing↑

A: But I just. Yeh it's mostly books (.2)

A: I mean, look it's a bookstore ((A turns the screen towards B opposite then back to herself again))

B: alright, well (8s)

A: yeh i think this area is mostly (4s)

B: What did'y, did you get Martha's email↑

B: She wants to visit august 15th to 19th ((A conversation about Martha's email follows…))

A: There's supposedly shopping in Kungsholmen

B: Yeah sure. You wanna go there↑

Figure 6: Searching for a shop

this search for shops, there is also a decision that must be made collectively as to where to actually go. This is somewhat similar to the situation discussed in [3], in which a group of tourists is working around a map to find things on the map and also trying to collectively decide what to do on the day. So the search here is also a process in joint decision making.

The heart of the exchange, however, takes place over two question and answer sequences (marked 1 and 2). In the first exchange, the question "`what's a hobby shop`" starts a discussion of what a hobby shop might be, and the answer "`trains`" is compared with the results from the store's website (which seems to offer a range of goods that are not fitting with the description 'hobby shop'). In this exchange the website for the store is used to correct Yelp's misleading categorisation (from hobby shop to home-goods store).

The second exchange takes place in a similar way ("`there was one used consignment-consignment place`"), although with an evaluation followed by a query and then an answer. In this case it is also the store website that allows for a correction of the description given in Yelp – (from "consignment store" to bookshop). The source of the conversation in each piece is the category that Yelp puts each store into, with the searchers trying to 'decode' the description into something more understandable to them. In particular, since they are searching for a store that sells bags, the relevant question is whether each store will sell bags – and the sort of bags they are looking for too. In each case, it seems like the categories that Yelp use do not quite fit with the local Swedish stores being described. Indeed, Clas Ohlson, the 'hobby shop', is in some ways an almost 'uncategorisable' store as covers more than home-goods.

Since the couple are deciding where to go together, the participation of both parties is of some relevance. For similar reasons to do with 'managing participation' found in the first clip (figure 2), we see questions being asked about the search results – although here the passenger also queries the description 'used books'. While these may certainly be genuine questions to clarify what Yelp has returned, they also have the result of bringing the passenger into the phone interaction, as does the second exchange. Yet, even in the second case of the 'used vintage consignment' shop there is a puzzle set up in terms of this shop being "`more of a book shop`" – which prompts the question "`Why do you say that?`" and finally the turn to share the phone screen.

Alongside *questions*, the driver here also *narrates* aspects of the search as it is conducted. Again this narration of the search acts to include the passenger in the search even though they have no visual access to the screen. The narration allows the driver to ask questions without having to explain again the context of their activity. Narration here thus works as a kind of ongoing commentary to the activity that covers for the lack of visual availability of the screen that we saw in the first extract.

Timing and insertion sequences

Much of the above discussion has focused on how the talk is organised around the search itself, but we might now move on to consider how it is that search itself is organised to take into account its role in conversation. Now much of the arrangement of the search is dictated by the tool or website being used – indeed, there is an almost fixed pattern of input of search terms followed by output of search results which can then be sequentially inspected. Yet the system also has situations where it waits for input by the user, and where the system can be 'paused'. There are also situations where the system itself pauses as it has to fetch the given results or website.

As Licoppe [14] discusses, the delays of the interface can be used to help manage aspects of the conversation. For example, "but I think it could be more of a book store", is said as the webpage for the book store is selected, an operation which takes much longer than moving around the interface of the Yelp application. This following conversation is thus 'timed' to happen in a lull in interacting with the phone, where the attention of the driver is freed up. We can see aspects of the interaction which take into account the attention of the driver – leading to pauses where the driver visibly reads, and there is no talk filling the gaps.

The organisation of narration also indicates to co-present others when there may exist a opportunity to introduce a different conversation topic; in transcript 2 participant B around the end waits for a pause in the spoken summary of the search results, to raise the subject of a mutual friend's email, (What did'y, did you get Martha's email?) which is discussed for several minutes, before A returns to the task in hand of researching a shopping area. This sequence can be seen as a form of 'insertion sequence'– interludes of talk and interaction inserted within the main task of conducting an online search. This also displays something of the temporal organisation of mobile device use, in that the search can be 'paused' and another matter attended to with no concern about the task lapsing on the phone. Devices wait until the next action so long as there is no realtime action (such as game playing) unfolding.

Clip 3: Result and conversational mirroring

Each of our clips so far has dug into how the searchers manage the search results in their conversation with each other. What we are seeing is the ways in which a search is conducted, not only with regard to the interface of the website or search engine, but how talk and the search itself is interlaced by those talking. In these clips the search is as much about the talk as it is about the search technology.

Yet how the results are displayed and parsed can also have a substantive role on conversation – to the point of ordering and shaping what is talked about. Figure 7 contains our final clip, and we return to our two participants from our first clip. In this instance we are at the start of their day out where they are deciding what they might do for the daytrip.

((A runs a search in Google for things to do in London when it's raining and sits down while waiting for search results to fill in. Participant B looks over to the handset from the left))
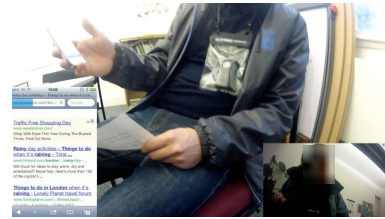
B: Is there actually a thing that says when it's raining↑

A: It's rainy day activities=things to do when it's ra:ining ((A turns handset screen round more towards B))

B: aw right I see

B: yes ((B checking pockets for something))

A: eat ((A turns the phone and zooms in to read detail on the page))

A: Rainy days (.) find out what's on in (.) London's top museums (.) finds out… what's, °secret galleries°

A: what's a, what's a secret gallery?

B: that's a good question

A: we could go and walk around the Barbican

B: oh yeh (.) is there (.2) anything fun in there?

A: if not=yes there's all sorts of things on in there. Don't know what's on there at the moment ((A scrolls down a page of 'secret gallery' listings))

B: °read them out°

A: we've got Auto Italia [*] on the Old Kent Road

A: [*] uh (.) yeah no, that's just some

A: Banner repeater [*] in Hackney >i told you we should go to hackney<

B: heh heh heh

A: uh (.) The Cabinet gallery in Old Street (.3) uh

[Cabinet gallery discussion deleted]

A: Where w:was the Barbi-Barbican?

((short discussion of camera position, user goes back to rainy days page and then selected the Barbican page))

A: RAIN ROOM

B: ah

A: they've got something called the rain room

B: oh [let's go there]
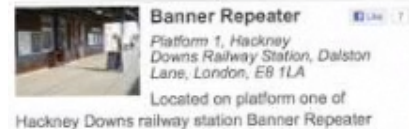
A: [okay let's go there then]

Figure 7: Searching for a destination

In this extract we see again a prolonged search, again taking place around 'what to do' – although unlike our earlier example which was based around which shop to visit, this search seems more open ended, constrained not by the search for a particular purchase but initially by the weather; 'things to do in London when its raining'.

The first hit for the google search 'things to do in London in the rain' leads to a page from 'Time Out', the website for the popular listings and guide magazine. This page is selected and loads at the beginning of our extract and after some complaining about the speed of the page loading, the non-phone using participant asks a question about the results, leading the 'driver' to turn the phone to the other participant at the start of the clip. The rest of the extract then takes place on the Time Out website as different activities suggested for a 'rainy day' are inspected, before the decision is made to go to the 'rain room.'

As in our previous two clips 'the driver' takes on the role of narrating features of the search, and in particular describing the different options from the website. Again, we can see the use of questions about the items to manage the participation of the non-driving user – such as "what's a secret gallery" and "where was the barbican". As the website is scrolled through we have a narration by the driver which in turn leaves slots for conversation by the second participant, and at times is explicitly prompted by the driver. While the driver talks more the second participant clearly has an involvement in their final choice of visiting the barbican – commenting "oh yeh (.) is there (.2) anything fun in there?" when it is first mentioned, and "oh let's go there" when the rain room in the Barbican is mentioned. Clearly both participants are orientated towards the joint nature of their activity and the need for an agreement about what to do, informed by the details of their search. In the extract in figure 8 we can see how the conversation follows the format of the search results from the Time Out website.

The website is organised in three 'levels' of a hierarchy, and the conversation takes place within 'Galleries'. The Barbican centre is mentioned quite early on, but rather than accept this as their destination the driver proceeds with the search and conversation through three of the 'secret gallery' entries. This is perhaps an attempt at a 'reasonable' search, where alternatives are considered without taking the first (or the second) suitable destination, leaving some time to consider alternatives. At some point the list of alternatives seems not to be raising preferable candidates, and so the 'secret gallery' line is abandoned and the search then jumps to see what exactly they might go and see at the Barbican, since it is a large arts centre with multiple exhibits.

One point to make about this traversal is that the order is 'seen in common' by both participants seated around the phone. While most of the items are narrated by the driver, the Barbican is actually first mentioned by the passenger. The sequence of the conversation then follows in a fairly straightforward way. After visiting the Cabinet Gallery website the 'secret galleries' list is abandoned (it has four entries) and they return to the original 'Rainy days' page.

Candidate-evaluation slots

Even more than our previous clip, this extract takes the form of sequences of 'candidate-evaluation'. Or perhaps a more fitting description is 'candidate-evaluation *slot*', since many of the comments that are given about each establishment are not clearly positive or negative. Rather perhaps it is that the narration brings up candidates which can be evaluated (or not), with the search for a 'positive evaluation', which will help the joint choice. In fact the two participants come quite quickly to an agreement at the end, both picking the Rain Room simultaneously.

The organisation of the talk in terms of 'candidate-evaluation slot' works well with the overall task of the day: to decide together on a place to go. This relies upon a sensitivity between the conversationalists to not force an option that they might find desirable yet to express their own evaluations (which may be very vague), yet do this within the bounds of a mutual accommodation of each other that necessitates an amortisation of one's own desire.

Or, as Brown and Laurier put it, in discussing some similar data: "By bringing up each place tentatively they allow others to express a desire or interest in each of these activities, to gradually come to an agreement on what would be fun for all of them. The ambiguity of their conversation is not a problem for the friends, rather it is a feature of the geography of the route they are producing, one which weds the plan to their activity" [3].

Through *not* commenting on the possibilities raised by the search, the participants then allow each other to express their view, but also to take into account uncertainty over what to do that day. Simply put, as planning a day out is a step into the unknown whatever they choose to do will be something of a guess and the conversational organisation here affords this uncertainty in some ways.
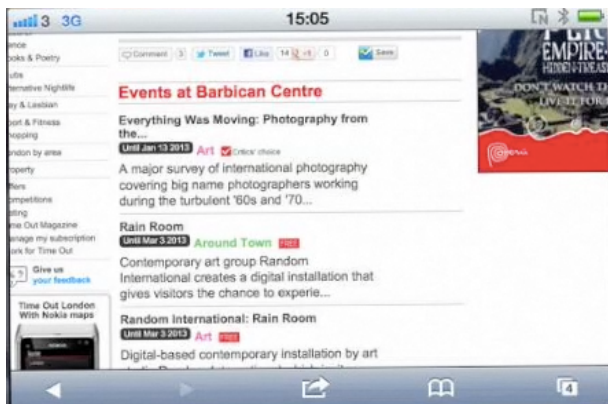

```
A: [*] RAIN ROOM
B: ah
A: they've got something called the rain
   room
B: oh [let's go there]
A:    [okay let's go there then]
```

Figure 8: Deciding on the rain room

DISCUSSION

We have presented here results to open up some aspects of how devices and conversations are integrated with each other. Each of these cases present different aspects of how searches get started, and how participation comes to be managed drawing on the nature of search results and using it to structure and manage the conversation.

Rethinking search results

While previous search research has documented how information seeking goals shape search, here we show how the search activity is one that is conducted in concert with conversation and the interaction with others. Broadly then, we would argue that search should integrate with the conversational context as much as it does with the goals of a single searcher. Search is interwoven with conversation.

Take, for example, the initial points about occasioning search; it should be possible to produce devices that would apply speech recognition to all talk occurring around the device. Interaction in the background has been pioneered commercially recently with "Google Now". This could be taken further, and lead the device to look for 'occasions' for search thus pre-empting search, placing results on the home page. Two ways of doing this might be to identify searchable objects that occur in talk and offer results, or find nouns or questions and offer these as search terms.

A second set of implications might be found in how the hierarchy of results and how their role in conversation plays out. The simultaneously of talk and search here does present some challenges to spoken word and audio search solutions, since these potentially might not support the different modalities as well as an existing text and screen based search might. Some applications take a more hybrid approach than a conversational one – with spoken words leading to a more traditional list of search results, and in fact this might fit better with the nature of search in interaction.

A third strand could be the ways in which the user can manage the expansion of the one-user-one-device interaction paradigm to allow for this socially inclusive use of a primarily personal device. Detecting when more than one person is focused on the screen and delaying incoming message alerts or other such personal information while increasing the size of fonts, volume, or brightness may be a first step towards more integrated designs where, if such a situation is detected, the participants devices and others in the location could collaborate to provide a larger input and output space.

Devices and interaction

Alongside these design issues, however, we are also deeply concerned with questions on the roles of devices in interaction and talk. There has been growing popular concern and attention on the role of mobile devices as forms of 'distraction', for example in education and driving [11, 22]. More recently, there has been growing discussion of the detrimental role of devices in our interaction with others [13]. Are mobile devices destructive to that important realm of human sociability – the conversation?

A full account of these questions is outside the scope of this paper. What we can say, however, is that we see considerable attention, effort and thought given to co-conversationalists while using a mobile device. Rather than shutting off conversationalists from each other, the devices become a site of investigation and discussion. As with any object or device that is predominantly designed for single person use we might question how limited these resources and adoptions might be, but it is apparent that the devices do not kill or negate conversation, but rather that they are skilfully deployed in conversation with others. This is not to say this is always, or even frequently, the case but rather that these facilities are grossly present in multipart interaction.

Moreover, we have a natural scepticism as this debate seems to arise with nearly every new technology encouraging both dystopian and utopian discourses. Mobile phones have been through this before, with questions and debates around the initial use of voice and text-messaging. Within much of the literature around device use, the concept of distraction has been a common motif. Yet this might simply be an inadequate concept for understanding device use, as it implies an agent with a central singular focus who is then distracted by a device, or by a conversation, and so whom then must maintain multiple separate interactions. Rather in the videos that we examine here both conversation and device use are co-produced, with both the conversation influencing device use and device use influencing the conversation. This is not to say that devices do not distract, or that one cannot find cases where devices cause problems for focused proximate interaction. Rather our point is that for these cases of ordinary interaction – collected during cases of everyday usage – we find this threading much more prevalent than problematic incidences of distraction. We suggest then that work seeking to understand the nexus of talk interaction and device use, rather than seeing them as necessarily separate or in conflict, is likely to be more promising.

CONCLUSION

This paper has examined in detail how social search is part of conversation with co-present others. Firstly, we documented how talk occasions search, providing the example of a "searchable object" – something referenced in conversation that can be found with an online search. Secondly, we described how multi-party interaction around a small mobile device naturally falls into a division between driver and passengers, in that one is holding, interacting with, and orienting the display of the device and the others are observing. However, both the driver and the passengers are involved in the search – through the talk around the search we have shown that those in both roles are active even if only one directly controls the interface. Specifically, we discussed how questions and narration are used to involve and manage the participation of those co-present. We then discussed the role of timing and the search interface, and how the hierarchical organisation of search results in a list form can be mirrored in conversation. Finally, we talked about situations where one result must be collaboratively chosen (such as a shared destination) and

how in such situations, the conversation tends to be arranged as an example of candidate and evaluation slots.

Through these extracts and the broader corpus we have uncovered complexity in how search comes to be threaded with conversation. Clearly devices do not simply take us away from interaction with others. The notion of distraction is much too simplistic to explain the situations here. Rather our results point once again to the diversity of device use in everyday life. Our interactions display a robustness and richness that escapes the attention of those who wish for simplistic narratives of technological disruption.

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