Dialogue in joint activity: complementarity, convergence and conventionalization

Abstract

Dialogue is tightly interwoven within everyday joint activities that require moment-by-moment coordination of utterances and actions. A common account of coordination is that it is established via progressive convergence (alignment, entrainment, similarity) of interlocutors' representations and behaviour. In order to examine how coordination is established and sustained, this paper distinguishes between (1) Semantic coordination of referring expressions (2) Procedural coordination of the timing and sequencing of contributions. Drawing on data from a series of maze experiments, this paper shows how both kinds of coordination result in the rapid development of highly elliptical, systematized and normative conventions. Focusing on how these conventions are established, this paper shows how interlocutors exploit partial repetition as an interactive resource, resulting in interlocutors' turns becoming progressively divergent and complementary. Further, this paper develops the claim that since repetition is best conceived as a special case of complementarity, it cannot be the general explanation of coordination.

Keywords

Dialogue, grounding, alignment, (mis)communication, coordination, sequentiality.

1. Introduction

Dialogue in joint activities is the most basic form of language use. We learn language via dialogical interaction, and it is in our everyday conversational interactions that we use language.

A central feature of dialogue is that it is intertwined with our activities in a myriad of ways: for example, conversing with a friend while walking down the street, joking while passing food around the table, or making small-talk while buying something at a shop. Dialogue can also serve to elaborate or augment an ongoing activity, for example a dentist explaining the stages of a procedure, whether for the comfort of a patient or to instruct a student.

More importantly, successful performance of an activity often depends intrinsically on dialogue, in particular on activity-specific utterances that coordinate how the activity unfolds. Purchasing an item in a shop requires performing the correct requests, actions and responses in the correct order. Similarly, two people maneuvering a large piece of furniture up a flight of stairs must communicate moment-by-moment in order to establish when and how to lift.

Finally, even in the absence of any overt physical actions, dialogue is *sui generis* analyzable as a joint activity (Clark, 1996). Interlocutors must collaboratively negotiate how to transition through different stages in the conversation; the form of this negotiation depends strongly on the type of conversation (e.g. story-telling, gossiping, enquiring about a product's price, or inviting friends for dinner) and here too, successful coordination can also require the use of activity-specific expressions and routines.

These insights have yielded theoretical units of analysis that take into account the relationships *between* multiple utterances and actions, e.g. language game (Wittgenstein, 1958), speech genre (Bakhtin, 1986), activity type (Levinson, 1992), speech act[1] (Austin, 1962), adjacency pair (Schegloff, 2007), joint project (Clark, 1996), scripts (Schank and Abelson, 1977), communicative project (Linell, 1998).

Based on these insights, a vast body of work has uncovered the rich variety of communicative devices (i.e. conventionalized, interactive routines) used by interlocutors to both establish and sustain coordination in joint activities, e.g. the use of gestures or body-posture to signal readiness to engage (Kendon, 1976; Schegloff, 1998), the use of special kinds of utterance such as "outlouds" (Heath and Luff, 1992) or other signals to suspend and resume the activity (Bangerter and Clark, 2004), as well as the use of physical artefacts to coordinate the activity (Scribner, 1986; Hutchins, 1995).

Using these kinds of routines seamlessly in the interaction can require extremely high levels of moment-by-moment phonological, lexical, syntactic and semantic coordination of both utterances and actions, between multiple interlocutors. This can involve knowing specialized vocabularies, knowing which behaviour is sanctioned, which complementary actions, utterances and associated roles your interlocutors are performing, which roles and associated actions you are expected to perform, and when and how to perform them. Even in non-verbal activities, studies of joint action have demonstrated the rapidity with which participants establish coordination that allows them to predict the timing, spatial orientation and format of each other's actions (Sebanz, Bekkering and Knoblich, 1992).

Despite its centrality for any theory of dialogue there has been a paucity of experimental studies that systematically address how interactive routines become conventionalized in the first place. On the one hand, studies of interactive practices (e.g. situated cognition, ethnographic studies, conversation analysis) typically restrict their analyses to single (or few) episodes of interaction. The analyst's task is to uncover the (often highly tacit and activity-specific) conventionalized routines used by interlocutors, yielding highly detailed analyses of short stretches of talk. However, these studies do not systematically address how two or more interlocutors, when encountering a novel situation, interactively conventionalize novel routines for coordinating with each other in the activity *ab initio*. Nor do these studies systematically address how these conventions might be transformed on each occasion of their use (whether successful or unsuccessful), as interlocutors become progressively coordinated.

On the other hand, experimental approaches that *do* study the emergence of conventions in dialogue typically restrict their analyses to the study of referring conventions, also eschewing systematic analysis of how the interactive routines that yield these referring conventions are established and sustained. Within these approaches, conventionalization in dialogue is typically framed as a problem of how two (or more) participants converge on the same referring expressions. The immediate question that emerges is: How amenable are the basic coordination mechanisms proposed by existing accounts of referential conventions for explaining how interactive routines become established? Can the development of routines be adequately accounted for as a form of progressive convergence?

The point of departure of this paper is to clarify how existing models account for convergence. First, this paper argues that convergence presents interlocutors with a SEMANTIC COORDINATION problem: interlocutors must adapt the semantics of their referring expression to each other and the demands of the activity. The development of semantic coordination exhibits patterns of repetition that cannot be adequately captured with existing models. Second, coordinating on routines requires PROCEDURAL COORDINATION of the timing and sequencing of contributions. Procedural coordination is underpinned by interlocutors making

[1] This only applies to Austin's speech acts, as Searle's subsequent formalization (1969) removed the requirement of "uptake" by the hearer.

COMPLEMENTARY and different contributions. The "progressivity" (i.e. "forward momentum") (Schegloff, 2007) of an interaction depends intrinsically on interlocutors *not* repeating each other's utterances. Since repetition in dialogue is a special case of complementarity, it cannot be the general mechanism behind coordination.

To examine separately how both kinds of coordination are established and sustained, this paper draws on findings from a collaborative maze task.

In accounting for the development of SEMANTIC COORDINATION, this paper draws attention to the central role played by partial repetition. The proposal advanced here is that turn-by-turn repetition of structure is best conceived as a form of scaffolding which supports the repair of existing representations and also supports the construction of novel representations. While some of these supporting structures might become integrated into the resulting representation, they need not be; some may be reused to construct other representations, and others may simply be used on a single occasion and then discarded. Convergence does not arise straightforwardly out of repetition – the structures that are repeated turn-by-turn are not the same structures that end up being converged on over the course of the interaction.

In accounting for the development of PROCEDURAL COORDINATION, this paper argues that from the outset of the interaction participants' are orientated toward the COMPLEMENTARY structure of their contributions. Interlocutors use communicative devices for establishing complementary structures, in particular for anchoring contributions at sequential and temporal "junctures" within the activity. As procedural coordination develops, and the forward momentum of interlocutors' contributions increases, interlocutors produce progressively *divergent* turns, demonstrating that coordination cannot be explained as a straightforward form of convergence.

On encountering a novel activity with a novel partner, neither SEMANTIC nor PROCEDURAL coordination can be presupposed. However, on encountering and resolving both kinds of coordination problem, the solutions become progressively refined and systematized. As coordination progresses, and the activity becomes sufficiently well-defined, this paper argues that in addition to developing normative referring conventions (see Brennan and Clark, 1986, "conceptual pacts"), interlocutors also rapidly develop normative procedural conventions (i.e. "procedural pacts") for resolving the procedural coordination problems encountered in the activity.

2. Accounting for coordination in dialogue

2.1. Semantic coordination of referring expressions

One of the most basic findings in studies on referring conventions is that convergence requires interactive negotiation between participants (Krauss and Weinheimer, 1966; Clark and Schaefer, 1989). Crucially, the processes involved in establishing an initial communication system apply both to situations where no pre-existing conventions exist (Healey et al., 2007; Garrod et al., 2007; Galantucci, 2005), and also apply to situations for which participants already possess an ontology and referring schema (Garrod and Anderson, 1987). Even when referring expressions are given experimentally, as in the map task (Anderson et al., 1991), interlocutors still conventionalize novel ad-hoc semantic forms (Larsson, 2007). This suggests that successful communication requires more than just *individual* interlocutors being able to individuate and name referents – the demands of the interaction place constraints on mutual intelligibility which require interlocutors to interactively adapt their ontologies and the semantics of their expressions to each other and to the particular context.

Moreover, if participants interact within a collaborative activity, on repeated use, the semantics of the referring expressions become more concise, stable, and systematic (Clark and Schaefer, 1989; Garrod and Doherty, 1994; Schwartz, 1995; Healey, 1997; Mills and Healey, 2006; Fusaroli et al. 2012). As a result, the semantics of the referring conventions established at the end of the interaction at high levels of coordination can differ qualitatively from those used initially.

These findings suggest that explaining the aetilogy of conventions requires paying close attention to the *development* of coordination, in particular how global convergence that occurs over the course of an interaction arises out of local turn-by-turn processes.

2.1.2. Is global convergence driven by local repetition?

Perhaps the most seductively straightforward account of global convergence is that it is achieved via interlocutors' representations becoming progressively similar during the interaction: as interlocutors are exposed to each other's referring expressions, they gradually repeat more and more of each other's contributions, yielding progressively convergent referring expressions. All things being equal, the more similar (converged, aligned, entrained) the representations, the more coordinated the joint activity.

This picture of dialogue finds its strongest expression in the Interactive Alignment model of Pickering and Garrod (2004), which proposes that highly coordinated dialogue arises directly as a consequence of local turn-by-turn repetition at every level of linguistic processing (phonetic, lexical, syntactic, semantic, situational) and is further shored up by entrainment of speech-accompanying gestures, body sway, eye gaze and other forms of idiosyncratic behavior. For each level of representation and also for each link between levels, local turn-by-turn repetition leads cumulatively (via priming) to global convergence (alignment) in a winner-takes-all fashion, operating both within- and between- speakers.

But can this picture of local and global repetition adequately account for coordination? Aside from the observation that, in extremis, repetition, e.g. of words (Simon, 1975) or of roles (Conchiglia et al., 2007) is pathological, the local and global patterns observed in task-oriented dialogue work against this straightforward view:

First, accounts of global convergence arising out of local repetition are inherently conservative (Healey, 2004). Repetition as a mechanism only operates on pre-existing representations, and is consequently ill-suited for capturing novelty, except as a form of "noise".

Secondly, such conservative accounts are ill-suited for capturing how a convention, when used successfully, might be supplanted by another (Healey, 1997). Yet, interlocutors do *not* settle on the initially most frequently used convention; they continue to develop novel, more systematic conventions throughout the interaction (Garrod and Doherty, 1994) (see Table 1, below). Note that, although the collaborative model of Clark (1996) does not argue that convergence arises out of local repetition, it too is conservative, in that it provides no mechanisms for a successfully used convention to be supplanted by another (Healey, 1997).

Third, existing accounts are semantically neutral, rendering them insensitive to the development of systematicity (Healey 2004; Mills and Healey, 2008). The Interactive Alignment model, the Collaborative model as well as Conversation Analytic approaches are agnostic about the semantics of referring expressions, yet it matters which words are repeated: indiscriminate alignment is correlated with unsuccessful dialogue (Fusaroli et al., 2012).

Fourth, accounts of global convergence arising out of local repetition typically rely on this being an automatic, rapid process. However, repetition of another's turn in dialogue can have a multiplicity of strategic functions, e.g. confirming allusions (Schegloff, 1996; Heritage and Raymond, 2005), performing clarification (Schegloff, 1992) or correction (Jefferson, 1987; Saxton, 1997), or closing a sub-sequence of an activity (Schegloff, 2011). Even echolalia has been re-analysed as having a complex interactional function (Sterponi and Fasulo, 2010).

Fifth, Garrod (1999) raises the possibility that repetition of another's referring expression can have a different function at different stages of the interaction, depending on whether participants are more or less coordinated. Supporting this view, Mills (2007) found that on encountering problematic reference, interlocutors repeated each other’s semantic choices *more*, not less. See also Louwerse et al. (2012), who propose that interlocutors exploit synchrony as an interactive “recovery device”.

Taken together, these findings suggest that local repetition cannot be the primary mechanism giving rise to progressive global convergence.

2.2. Procedural coordination of routines

Although existing accounts of dialogue differ in their characterization of how coordination is achieved, they agree that convergence depends on referring expressions being embedded within a collaborative, meaningful joint activity (Brown-Schmidt et al., 2008; Brennan et al., 2010). Interfering with the activity, e.g. by limiting interlocutors’ ability to provide each other with feedback, impedes coordination: core dialogue phenomena such as referential contraction (Krauss and Weinheimer, 1966; Clark, 1996), alignment (Pickering and Garrod, 2004) and audience design (Brennan et al., 2010; Gann and Barr, 2012) only occur as a consequence of highly tacit reciprocal adjustment by interlocutors to each other's informational needs within the activity, as the interaction unfolds.

This raises an additional problem: In order for referring expressions to be meaningful, they have to be associated with referents that have a meaningful role in the activity, and in order for these referents to have a meaningful role, the referents must be used by interlocutors in ways that have real, interactional consequences for their conversational partners, in particular for how the activity unfolds. For convergence to occur, referring expressions must have more than a simple referential function; they must be embedded within routines that are consequential for coordinating how the activity unfolds.

However, when encountering a novel partner, in a novel activity, it cannot be assumed that interlocutors are already fully coordinated on the interactive routines associated with that activity. This warrants the question: what is the basic structure of routines, and how are they established?

2.2.3. A more nuanced view: repetition as a “special case” of complementarity

One of the fundamental insights of Conversation Analysis is that coordination in dialogue is underpinned by sequential structures which consist of pairs of *complementary* contributions (Schegloff, 2007). These adjacency pairs consist of a first and second part that operate normatively: production of the first part creates an expectation that the second half is accountably “due” (Heritage, 1984), leading any response to be interpreted as pertaining to the second half. This locally managed system of local sequential coherence between turns results in global coherence through the hierarchical interleaving of embedded sequences that resolve local problems through, e.g. clarification, elaboration and reformulation (Levinson, 1983).

Although some adjacency pairs involve local repetition of another’s utterance, e.g. in greetings (“Hi” / “Hi”), or in exiting from telephone conversations (Schegloff and Sacks, 1973), repetition in dialogue is a special case of complementarity. This stands to reason, dialogue is intrinsically progressive (Schegloff, 2007”) and “enchronic” (Enfield and Sidnell, 2013). We don’t pathologically repeat each other’s utterances; in order for a conversation to have forward momentum, interlocutors must necessarily do something *different* than their interlocutor. Canonical examples of adjacency pairs include: question / answer; praise / self-deprecation; offer / acceptance (Levinson, 1983). Progressivity is not merely a structural issue but is a strong social norm: in order to maintain the forward momentum of a conversation, interlocutors will violate other norms (e.g. turn-taking and selection of the next speaker) (Stivers and Robinson, 2006; Schegloff, 2007).

Complementarity is also basic to joint activities. Successfully coordinating within a joint activity requires knowing the “next relevant contribution” (Clark, 1996: p252); Non-verbal joint actions also typically consist of complementary structures (e.g. giving vs. taking) (Newman-Norlund, et al., 2007) Importantly, both the first and second pair parts of complementary structures can be either an action or an utterance (Clark and Krych, 2004). Further, individual pair parts are typically associated with highly differentiated, complementary roles, whether brief and alternating (speaker vs. hearer) or more extended (customer vs. salesperson).

But how do interlocutors know what the 'next relevant contribution" is, and when and how to perform it? This raises a basic problem for both cognitive and conversation analytic studies, as both presuppose that adjacency pairs are already shared (and known to be shared) by interlocutors.

2.2.3. Conventionalizing complementary structures

When engaging in a novel activity with novel interlocutors, it cannot be assumed that interlocutors already know the first or second pair part, or even the minimal joint action that comprises both. However conversation analytic and cognitive approaches to dialogue have eschewed systematic analysis of how adjacency pairs are established in the first place. Further, once an adjacency pair is established, neither approach addresses how the progressivity of the same adjacency pair might change on successive use, or how an adjacency pair might acquire another conventionalized second pair part (Schegloff 2007: p251).

In addition, Schegloff (2007: p223) remarks that different activities can have very different associated routines for coordinating the activity which must be deployed at specific conventionalized "junctures" within the activity. How are junctures established interactively?

Adjacency pars are also normative conventions. If at a particular juncture an interlocutor cannot provide a second pair part that complements the other's action, interlocutors typically give an account for their inability (Schegloff, 2007). Examples include: giving reasons for declining an invitation or demonstrating inability to shake hands by showing how both hands are carrying heavy items. How do regularities of structural association between two pair parts acquire normative status?

Solving these procedural coordination problems is in the first instance an interactive problem faced by interlocutors. Modelling these problems and their solutions requires giving an account of how two *different* contributions come to be associated as part of a whole adjacency pair. Further, since one of the hallmarks of coordinated dialogue is its progressivity, the development of procedural coordination necessarily involves the *differentiation* of interlocutors' turns as coordination increases. (see Mills, 2011, for an initial attempt to investigate procedural coordination separately from semantic coordination).

2.3. How do semantic and procedural coordination develop?

When interlocutors establish a novel communication system for a novel activity with a novel partner, neither referential nor procedural coordination can be presupposed. This leads to the immediate question – how are both types of coordination established?

There is, prima facie, a tension between accounts of conventionalization which conceive of coordination as consisting primarily of the *repetition* of referring expressions (or, for that matter, of the turn by turn repetition of any communicative behaviour), and the observation that procedural coordination is underpinned by *different and complementary* structures between interlocutors. Accounts of coordination must explain how the development of coordination involves both systematic *convergence* of participants onto single referring expressions, while at the same time involving systematic local *divergence* of participants' turns into complementary contributions. Put simply, repeating another's turn is a special, not general, kind of "next relevant contribution", so cannot be the general solution.

This matter is made all the more pressing, as one of the main families of measures used to investigate coordination involves examining how repetition of structure (lexical, syntactic, semantic) relates to the quality of the interaction, in particular how repetition correlates with task success (Reitter et al., 2006; Ferreira and Bock, 2006; Healey, Purver et al., 2010; Fusaroli et al. 2012).

To this end, this paper demonstrates separately how semantic and procedural coordination develop during a simple joint activity.

3. Method

3.1. The Maze Task

The data come from a series of collaborative, computer-mediated maze experiments. The setup is a modified version of the original maze experiments conducted by Garrod et al. (1987; 1994), and is the same as that described in (Healey and Mills, 2006).

This task is ideal as it presents participants with two kinds of coordination problem. First, it presents participants with the recurrent need to refer to spatial locations, requiring participants to coordinate on the semantics of their referring expressions. Second, participants are faced with the procedural coordination problem of establishing routines for guiding each other through the mazes.

The computer-mediated version of the maze task exhibits similar local and global patterns of coordination to those observed in the original, spoken task (Healey and Mills, 2006; Mills and Healey, 2006; Mills 2007).

Dyads must solve 12 randomly generated mazes (see Figure 1), permitting systematic investigation of how the communication system develops on each iteration[2] of the joint activity.

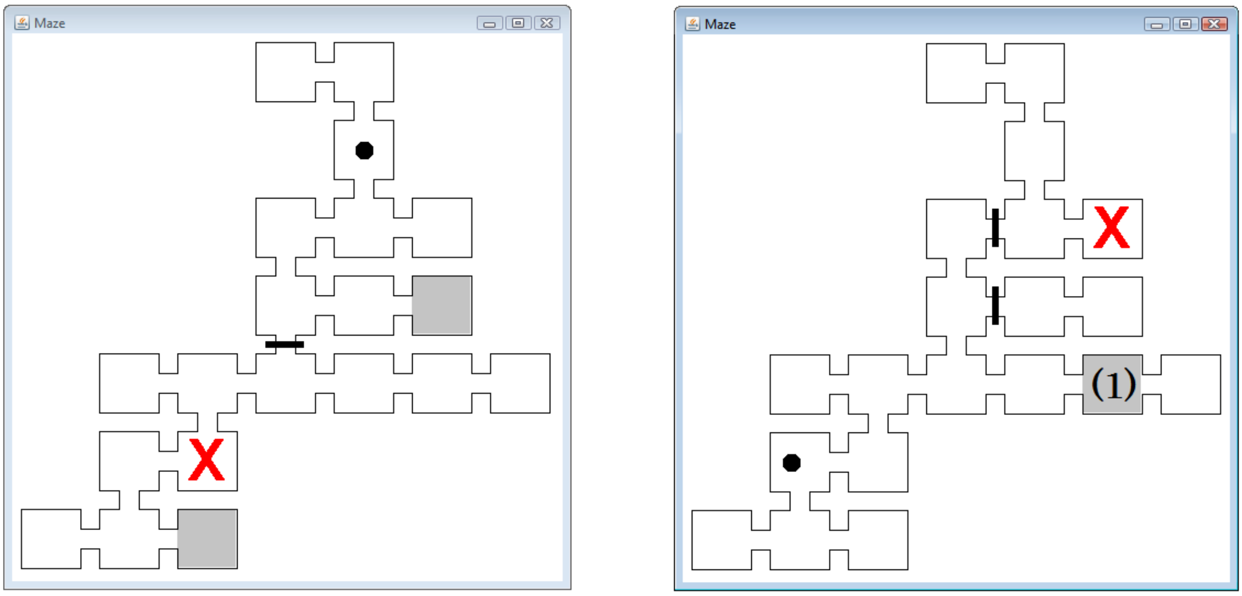

Figure 1: Example maze configuration

3.2. Procedure

Pairs of native English speaking university students participated for credit. Participants were given up to 90 minutes to complete 12 mazes. Dyads consisted of a mixture of familiar and unfamiliar pairs[3].

Participants sit in different rooms, in front of a computer screen which displays two applications (1) The maze application and (2) A text-based experimental chat tool for communicating. The maze application displays a simple maze consisting of a configuration of nodes that are connected by paths to form grid-like mazes. The mazes are selected so that participants encounter an equal number of grid-like and irregular shaped mazes. The black circle shows the player's current position and the cross represents the goal point

[2] The term "iteration" is too strong for describing most activities, as their boundaries will be much less clear-cut, especially at low levels of coordination. In the maze task it can be determined precisely when a dyad starts and finishes each of the 12 mazes, hence the use of this stronger term.

[3] Familiar dyads do not perform better than unfamiliar dyads when encountering *novel* referents in *novel* tasks (Schober and Carstensen, 2010).

that the player has to reach. Participants can move their location markers from one node to another via the paths. Each move is recorded and time-stamped by the server. The game requires both participants to move their location markers from a starting location to a goal. Although the basic maze topology is the same for both participants, each participant has a different starting location, a different goal location, different switches and different gates, none of which are visible to the other participant. They are also not able to see each other's location markers. Movement through the maze is impeded by gates that block some of the paths between nodes. These gates can be opened by the use of switches (grey coloured nodes). The locations of switches and gates are different on each maze and are not visible to the other participant. Whenever a participant moves to a node that is marked as a switch on the *other's* screen, all of the other participant's gates open. All the gates subsequently close when they move off the switch.

These constraints force participants to collaborate: In order for participant A to open their gates, A must guide B onto a node that corresponds to a switch that is only visible on A's screen (and vice versa). Solving the mazes, therefore (i.e. when both participants are on their respective goals) requires participants to develop coherent ways of referring to maze locations, while also requiring participants to develop procedures for requesting, describing and traversing switches, gates and goals.

All participants' communication occurs via a text-based experimental chat-tool (Mills and Healey, 2006; 2013 in prep). The chat-tool interface is equivalent to existing proprietary chat-tools (Skype, Facebook).

3.3. Data

The transcripts (see Appendix, below) are selected from a set of 32 dialogues as representative of the coordination problems encountered by participants. Each excerpt is a full transcript of a single maze trial.

4. The development of semantic coordination

4.1. The global pattern to be explained

Over the course of the interaction, participants' referring schemas become progressively concise and systematized. Consider the transcripts of Dyad1, Trials 1, 5 and 11 (in Appendix, below). Each transcript contains the full dialogue of solving an entire maze. Table 1 illustrates this pattern.

Initially:	OK, my grey switchpoint which you have to get to now is next to the top sticking out cluster
5 mins:	that's me done, can you go two down from the large block of squares on the right
10 mins:	Tell me yours and when I say, go onto the middle row, 3rd square from the left
15 mins:	Now to open it, wait 3 seconds then go 3rd row, 2nd sq from left"
20 mins;	wait then go 5th column top square
30 mins:	went back to 5th column top
35 mins:	now on 5 col, row 7 from left
40 mins:	then 5c r 7. yours?
45 mins:	5, 7

Table 1: Global development of coordination in the maze game.

Note how the type of description changes over the course of the interaction. Initially, descriptions use highly salient features of the maze, e.g. "*sticking out cluster*" or "*large block of squares*". During the interaction, the descriptions, in particular the counting conventions, become increasingly systematized. Crucially, this development of coordination is not reducible to referential contraction (Healey, 1997). The descriptions used at the end of the experiment are not abbreviated versions of those used initially: "*5,7*" is not an abbreviated form of "*next to the sticking out cluster at the top*"..

A consistent finding is that initially participants take over 100 turns to solve each maze. With task experience, participants take fewer and fewer steps to solve each maze, until the most coordinated pairs take about 8 turns to solve a maze of equal difficulty. What could account for these patterns of coordination?

4.2. Analyzing the development of coordination in 3 distinct stages

To analyze how coordination develops it is helpful to decompose the development of semantic and procedural coordination into 3 stages.

1. An initial stage of adapting to the new activity and conversational partner[4].

2. An intermediate stage of successful interaction, having coordinated both on a referring schema as well as routines for managing the activity.

3. A final stage of developing and systematizing the communication system.

One caveat, this paper is not suggesting these are distinct stages that can clearly be delineated, or indeed that they are cognitively real. However they are useful heuristically to demonstrate interlocutors' differential usage of dialogue mechanisms, in particular repetition, that occur at low vs. high levels of coordination

4.3. Stages in the development of semantic coordination

4.3.1. Low levels of coordination

Initially, participants are faced with the problem of adapting their linguistic resources to the task and to each other. In tasks which prevent participants from using pre-existing conventions, it is unsurprising that participants encounter difficulty in conventionalizing novel form-meaning pairings. It is perhaps more surprising that difficulties are observed even when participants already possess an ontology which should, on the face of it, be sufficient for individuating locations in the mazes. Describing locations appears deceptively simple. Most (all?) people know words such as "square", "box", or "row", and can also count from 1 to 7 (the maximum number of nodes in any maze). However, participants must coordinate on the semantics of these basic terms, e.g. whether rows can be diagonal, whether a grouping of nodes should be called a square, whether lines are the same as rows, and also which counting schema to use.

Consider Dyad 1, Trial 1, which demonstrates how having words for individuating referents is no guarantee of successful interaction. Line 9 contains the unwieldy and highly ambiguous description "*the third row up and second to the end block*. Depending on whether counting starts from 0 or 1, and whether "*second to the end*" counts from the left or right, this description could pick out many possible locations (it is the grey switch labelled 1 in Figure 1).

In Line 10 "*top*" could be either of the 2 topmost squares, and consequently "*across*" is also ambiguous, as it doesn't specify whether to count from the left or right. Further, Participant1 uses different conventions in the

[4] This stage is frequently ignored by studies of dialogue. Initial trials are simply discarded as "noisy" practice trials.

horizontal count "*2 across*" than in the vertical count " *down one*" to refer to the location where the position marker is.

This conflict over which counting schema to use lasts till Line 31. Note that when Participant1 proposes a Cartesian system "*do it graph / grid fashion*" this differs from the horizontal counting system "*second to the end block*" used previously in Line 9. Subsequently in lines 48, "*3rd block across*" counts differently again, and is not in Cartesian format. The horizontal Cartesian value should be *"6"*, counted from the edge of the window, not from the leftmost extension of the maze structure. This description also proves unsuccessful, leading at line 53, to Participant1 attempting a less restrictive way of counting the number of blocks in the row, which is then subsequently reused in Line 73 as part of a composite description that triangulates on the desired location by counting the rows, the number of squares in a row and the location's position within that row.

Transcript 1 shows how during a single trial participants attempt to negotiate different counting schemes. Coordination is achieved via partial repetition of the constituent elements of each other's descriptions, before settling on a hybrid scheme that neither participant originally proposed, and is less systematic than the "*graph/grid"* scheme proposed by Participant1,

This transcript, which is typical of initial maze game dialogues, also demonstrates the fundamentally opportunistic nature of interaction. It is not the case that interlocutors explicitly ground each utterance and only proceed once full understanding has been reached. Interlocutors start with descriptions that are not sufficiently well-defined to be used successfully, and then triangulate, via partial repetition, on a less restrictive schema for referring to maze locations.

Although this slippage between interlocutors is often characterized as a "trial and error" approach (Kecskes and Mey, 2008), this is not the same as "hit and miss": When interlocutors attempt to explicitly negotiate the semantics, more often than not these attempts prove less successful than tacit negotiation (see also Pickering and Garrod, 2004).

Note also how the interlocutors are also fundamentally concerned with establishing what the other SHOULD know. Turns such as "*like normal people*" (Dyad 1, Trial 1, Line 51) and *"USING ENGLISH"* (Line 67) demonstrate that right from the outset of the interaction, participants mark their epistemic territories (Heritage, 2012), treating failure to understand Cartesian systems as evidence of uncooperativity (Steensing and Drew, 2008).

4.3.2. Intermediate coordination: refining and systematizing

At intermediate stages of coordination, as in Dyad 3, Trial 3 which shows a dyad completing a maze in 30 turns, participants coordinate successfully, while continuing to systematize and refine their referring expressions. Here too, repetition plays a central role in shoring up the counting conventions: in Line 11, Participant10 seeks clarification with "*second column?*", yielding a response that retains non-systematized elements that identify salient features of the maze "*very bottom*". Similarly, the clarification request in (Line 27) "*1st column on the right?*", is answered with "*last column*", which also resolves counting via salience.

Further, this pattern of coordination suggests that the semantic coordination achieved by the *dyad* can be greater than that of the individual: Participant9 only uses descriptions that consist of vertical columns, whereas Participant10 alternates between both vertical and horizontal "row" descriptions. Throughout, Participant9 only uses descriptions that consist of vertical columns, yet when complemented with the horizontal row descriptions of Participant10, the descriptions constitute systematic Cartesian descriptions.

4.3.3. High coordination

In the later trials, pairs combine their descriptions into highly contracted and systematized Cartesian coordinate schemas. Consider Dyad4, Trial 10. All that remains on the conversational surface are the actual counts of the schema; a description such as "*3, 7*" is eliding a rich description which could be paraphrased as:

"*3 across, counting from the left edge of the main window, starting at 0, treating all empty space as if they were made of squares, ignoring paths between gates, and counting 7 down from the top of the maze in the same fashion*".

Importantly, as shown in Table 1, these highly elliptical abstract descriptions are NOT the same as those that are used successfully in the less coordinated stages; the ordering of the axes might differ, so might the counting schema (i.e. counting from 0 vs. 1 or counting from the left vs. right). This raises the bar for theories of conventionalization. Instead of conventions being established in a "winner-takes-all" fashion (Steels, 2003), successful use of a new, more systematic convention can require that *both* participants incorporate each other's perspectives, as in Dyad 3, Trial 3.

Moreover, Garrod and Doherty (1994) argue that at high levels of coordination, the semantic model can acquire normative status. Although Garrod and Doherty propose that normativity arises as a consequence of the interaction, the negotiation of epistemic territory concerning Cartesian descriptions in Dyad 1, Trial 1 shows dyads treating Cartesian conventions as normative from the outset, even before they can be used successfully.

4.4. Accounting for semantic coordination

The central difficulty of accounting for the development of semantic coordination stems from the confluence of referential contraction and the development of systematic representations. This leads to some basic questions concerning the role of repetition. Some studies, e.g. Ferreira and Bock (2006) propose two distinct forms of repetition (short vs. long term priming) that are constrained by inter-individual memory mechanisms. Focusing on the intra-individual, interactive patterns of repetition in maze task dialogues points towards the interaction itself placing different constraints on short vs. long term repetition. To illustrate these constraints, this section distinguishes between local, turn-by-turn repetition, and global repetition that occurs over the course of the interaction.

The kinds of repetition that occurs at both timescales suggest that global convergence does not arise straightforwardly out of local repetition. Instead, local repetition is best conceived as scaffolding which supports the repair of existing representations as well as the construction of novel representations. While some of these supporting structures might become integrated into the resulting representation, they need not be; some may be reused to construct other representations, and still others may simply be used on a single occasion and then discarded.

4.4.1. Global repetition

At the end of the task, the most coordinated dyads consistently use *different* semantic models than at the start. Consequently, as interlocutors become coordinated they repeat *less and less* of the initial semantic model. In addition, the global change in semantic model has a top-down effect of accelerating lexical change. As identified by Pickering and Garrod (2004), when participants switch to a different semantic model, they also use different words to identify the same constituent elements in the new model, for example switching from talking about the "*top row*" to talking about "*the 3rd line*".

Instead of driving coordination, long-term repetition of semantic model might simply be indicative of *low* coordination, caused by interlocutors being unable to move beyond the local minimum in the coordination equilibrium established at the start of the interaction. For example, if participants are unable to establish counting conventions, and instead continue using less systematized descriptions that rely on salient features of the maze (e.g. "*at the top of the biggest section of the maze*"), this will yield much higher global repetition scores.

What, if anything is being repeated long-term over the course of the task? A simplified characterization of the global development of coordination (i.e. Table 1) is that initially participants use referring expressions that rely on salience, such as "*the sticking out bit*" or "*the large square*". These are subsequently used to clarify the counting conventions of more systematic descriptions, such as "*third along the row from the sticking out bit*". These, in turn, yield more systematic descriptions such as "*third along on the 2nd row*", which interlocutors combine into more systematized Cartesian descriptions such as "*third row, fifth column*", before finally stabilizing as highly elliptical Cartesian descriptions such as "*(3,5)*". Each stage in this process relies on prior coordination on a less systematic representation.

4.4.2. Local repetition

Since global coordination involves systematic development of different representations, this differentiation must also be evident at a local turn-by-turn level. Models which explain convergence arising out of local repetition are intrinsically ill-suited for explaining these patterns. The global development of coordination (illustrated in Table 1) can only be achieved if interlocutors *do not* fully repeat each other. Moreover, since there is a consistent pattern of developing more systematic representations, the elements that are not repeated cannot be explained away as noise or random drift.

Although studies of priming typically assume that immediate repetition is, all things being equal, indicative of successful communication, local structural repetition is one of the central ways in which misunderstanding is signaled. Perhaps the clearest example of this is embedded correction (Jefferson, 1987; Saxton, 1997) which shows how interlocutors exploit the local syntactic structure of each other's utterances in order to perform contrasts that highlight the problematic element. Consider Dyad 3, Trial 3, Lines 7-13. In Line 7, Participant9 instructs Participant10 to move to the location described as *"…second colmn – bottom*",. This proves unsuccessful, and leads, in Line 11 to Participant10 asking clarification with "*second column?*", yielding Participant9's response "*second column from right..very bottom*" in Lines 12-13. Note how in Line 12, Participant9 reuses the original term "*right*" from Line 9, while subtly changing the underlying semantics: In Line 9, the switch is referred to as being "*on the right*", whereas in Line 12, the switch is now located by how far it is from the "*the right*".

Note here that this *change* in semantic model which elucidates the counting convention is achieved tacitly via interlocutors' local repetition of each other's descriptions. Further, this change is not achieved via immediate repetition of "*right*". The part of the description that is repeated ("*second column*") is used as scaffolding to identify Participant9's turn in Line 7 as the source of problematic understanding (see also Healey et al., 2003; Purver et al., 2002; Schlangen, 2004), which prompts Participant9 to go back and repair the description.

Thus, high local repetition might be due to instances of clarification requests. However, presence of clarification requests need not indicate low levels of coordination. Clarification is indicative of participants noticing, signaling and attempting to resolve problematic understanding, and is more effective than other, more explicit forms of negotiation (Pickering and Garrod, 2004), and more effective than no clarification at all.

Arguably it is precisely at these junctures in the dialogue, where interlocutors perform local repetition to perform clarification, that the local and global processes intersect. This raises the question of how local structural repetition facilitates the development of more systematic semantic models. Extending the scaffolding analogy, when descriptions that focus on salient features of the maze are used interactively to resolve miscommunication, counting local repetition does not distinguish between scaffolding and the structures being constructed. Further, once the scaffolding is removed, as in the highly elliptical utterances, this shows that the structure is more robust (i.e. coordinated).

One promising means of investigating the point of contact between local and global repetition is to track the specific lexical, syntactic and semantic representations that are introduced, clarified, retained and subsequently elided. This would allow determining which kinds of local repetition (i.e. fine-grained addition, substitution and deletion of the constituent elements of interlocutors' referring expressions) promote or impede coordination, and would also allow determining which structures are retained globally as a consequence of specific forms of local repetition.

5. The development of procedural coordination

It should already be apparent that in addition to semantic coordination, the procedural language used to coordinate the timing and sequencing of participants' turns and actions also becomes progressively contracted. Returning to Table 1, initially interlocutors use lengthy, elaborate instructions, e.g. at (10 mins): "*Tell me yours and when I say, go onto...*", which contracts after 40 mins to "*…yours?*". Similarly, the instruction at (15 mins) "*...to open it wait 3 seconds*" shortens to "*wait…*" .

It is helpful to analyze the interaction in 3 stages. From the outset, participants' are oriented toward establishing complementary structures at specific "junctures" within the activity. As coordination develops and the activity becomes sufficiently well-defined, the complementary structures become conventionalized as normative procedural conventions.

5.1. Initially: weak coupling of pairs of actions

Initially, participants are faced with the basic coordination problem of coupling (Riley et al., 2011; Fusaroli et al., 2013) their individual actions and utterances perform the joint actions of guiding each other through the mazes. One basic strategy is for participants to overtly assume complementary roles, e.g. in Dyad 1, Trial 0, Line 2: "*me navigating and you driving*" or Line 41: "*I'll direct*".

At a finer grain, interlocutors' turns are often oriented, right from the outset, toward setting up local complementary structures produced by both participants: "*u go first, where do u need me to go?*" (Dyad 7, Trial 1, Line 3) or "*because then I let you first then I'll follow*" (Dyad 6, Trial 1, Line 8)[5].

A basic format for accomplishing this is "*You do X and I do Y*" or "*I'll do X and then you do Y*", or "*Do X so I can do Y*". These differ from straightforward requests, as the requests include *both* the first and second pair parts of a nascent adjacency pair, as opposed to asking the other simply to "*do X*".

Note, also that this process of coupling contributions is highly opportunistic. Interlocutors do not have a clear notion of what they are doing, much less a global plan of how to proceed. See, for example, Dyad1, Trial 1, who manage to solve the maze without being fully coordinated, answering in Line 103 to "*what did you do differently?*" with "*nothing*".

Similarly in Dyad 5, Trial 1. Lines 2-7. Participant6 requests "*do what you did before*". Participant6 doesn't even know which move to request. More importantly, neither does Participant5, who asks in Line 8: "*now?*". Intriguingly, this shows that both participants are orienting towards a nascent complementary structure, consisting of two parts, neither of which is known to either participant.

5.2. Medium levels of coordination: constructing an activity

After achieving basic coupling of their actions and turns, participants become progressively coordinated, developing a stronger sense of the activity, i.e. the "synergy" (Fusaroli et al., 2013) between them. Participants negotiate the sequential implicativeness (Schegloff and Sacks, 1973) of their contributions; that is, they negotiate what they do and don't need to confirm, inform and request of each other, and also establish the relevant "junctures" (Schegloff, 2007: p223) in the unfolding activity where particular contributions need to be made.

There appear to be a whole range of communicative devices used by participants to cement routines at specific temporal and sequential junctures in the activity. These devices work by reference to a particular sequential location within the activity as a whole. Put differently, the dyads treat the procedural coordination problems they encounter, not as one-off coordination problems, but as a recurrent problem which occurs on each occasion of the activity.

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[5] This example is of particular interest, as both participants are coordinated semantically, using Cartesian descriptions, but still encounter difficulty coordinating on the sequential structure of their interaction.

Consider Dyad 4, Trial 8, Line 6, which is from a medium coordinated pair. Here ParticipantB tells participantA "*If I do nothing it means I cannot get there*". Importantly, ParticipantB does not simply say "*I cannot get there*". This transcript is especially interesting: First, it demonstrates the explicit introduction of a complementary convention in which silence and inaction become conventionalized as a "move in the activity", within an adjacency pair whose first pair part is the ABSENCE of action. Second, conventionalization is achieved by giving a PRE-EMPTIVE form of "accountable absence" (Schegloff, 2007) suggesting that there is a normative dimension to this convention. Third, this turn is introduced by reference to the next iteration of the activity. Finally, this example underscores the fundamental importance of looking at multiple iterations of the same activity, as one could only know whether silence had an interactive function by looking at multiple prior occasions of the activity, where the convention was introduced. This also suggests that the conversation analytic "next turn proof procedure" (Heritage 1984) would need to be extended to a "prior occasion of the activity proof procedure".

Other examples of establishing junctures by reference to the activity as a whole include constructions such as "*now you need to do X*" (e.g. Dyad 3, Trial 3, Line 19) or "*Next time do X",* instead of simply saying "*do X"*. This presupposes that participants are already sufficiently coordinated in the activity to know what the "*next time"* will be. Other forms of anchoring an utterance in a particular sequential location in the activity include saying "*at this stage we do X"* or "*here we do X"* instead of simply making the request. These devices tend to be deployed toward the middle of the task, once a certain level of coordination has been achieved.

Importantly, once these coordination problems have been articulated, addressed, and resolved, they no longer need to be mentioned explicitly. Since the solutions are cemented in place, they too can be elided, allowing more tacit and contracted procedural expressions, yielding an activity with greater progressivity.

5.3. High levels of coordination

After establishing successful coordination, coordination *continues to develop*. Participants' turns become more contracted, and also take fewer exchanges to solve the mazes. Although each maze can be solved in a few steps, each dyad establishes (often subtly) different complementary structures for signaling in the task. See for example Dyad 4, Trial 10. Here, the participants signal to each other how to progress through the maze by using three words "*open*", "*trapped*" and "*home*". Importantly, "*open*" does not simply mean that the gate is open. In much the same way that the participants develop highly abbreviated referring conventions, "*open*" means something akin to:

"*My gate has opened but I can't get to my goal, if you are able to, please go to your goal and then tell me when you're on it, otherwise tell me and I will then go to a switch that you just mentioned and wait there either until one of my gates opens or until you tell me to go to the goal"*. Further, since this is the same Dyad described in the preceding section which gave a pre-emptive form of "accountable absence" (Dyad 4, Trial 8, Line 6), it would also have an additional meaning of "*..but if I do nothing it means I cannot get there"*.

Importantly all this is achieved with a single word, "*open*", without an overt request, that simply articulates a state in the activity. Note that "*trapped*" and *"home*" have similarly rich sequentially implicative functions. Even utterances as innocuous as "*me now*" in Dyad 4, Trial 12, Line 6 are highly dyad-specific: Does it mean *"now it's my turn to speak", "it's my turn to guide you through a gate"*, "*my turn to go onto a switch*" or "*my turn to wait* ". In much the same way that different dyads might mean different things by *"row"* or *"square"*, the same words used by different dyads to coordinate procedurally acquire different procedural functions that depend on the specific conversation history and coordination problems encountered during the interaction.

In the most coordinated pairs, each contribution effectively becomes a "move in an activity" with a multiplicity of retrospective and prospective functions, resulting in an extremely rich procedural semantics for coordinating the activity. Each contribution can perform multiple simultaneous speech acts, i.e. participants are simultaneously posing and answering multiple "Questions Under Discussion" (Ginzburg, 2012), often with a single word (See Gregoromichelaki et al., 2012; 2013). Note that although many questions are being asked (and answered) with each turn, the turns do not have the canonical syntactic structure of a question.

A further hallmark of this coordinated stage is that the task actions themselves (i.e. the opening and closing of gates) also acquire sequentially implicative functions. In the initial stages of the maze game, opening gates is typicallypreceded with a turn similar to "*can you go to my switch on the top row, 5th square?*". Within speech act theory (Austin, 1962; Searle, 1969), this would be conceived of as a perlocutionary effect, or as the second pair part of a "projective pair" (Clark and Krych, 2004). However, towards the end of the task, participants use the opening and closing of gates to signal to each other whether or not they are able to progress unproblematically through the maze (as suggested by "*If I do nothing it means I cannot get there*" in Dyad 4, Trial 8), and can be used as the first pair part of a complementary structure. Opening of gates becomes an illocutionary act, instead of a perlocutionary effect.

5.3.1. Normativity and procedural "pacts"

How do interlocutors achieve this level of coordination? Comparing dialogues in the early trials with the late trials is all the more striking, given that all mazes are randomly generated and therefore, on average, equally difficult. It appears that once a basic level of coordination has been achieved, each procedural coordination problem, once articulated and resolved, no longer needs to be overtly mentioned, consequently enriching the sequential implicativeness of each turn. The procedural function becomes “transparently absent”, having disappeared from the conversational surface. The data strongly suggest that in the most coordinated dyads, this culminates in normative conventions. Analogously to Brennan and Clark's (1996) conceptual pacts, interlocutors are also establishing ‘procedural pacts’ with each other.

Dyad 4, Trial 8 already showed participants explicitly establishing a conventional meaning for silence at a key juncture in the dialogue. Further evidence for ‘procedural pacts’ can be seen at high levels of coordination. Consider Dyad 8, Trial 6: Note, in Line 5, Participant16 explicitly introduces "*ATG*" to mean "*at [your] goal*", followed by a respecification of "*ATG*" as a question, effectively asking "*are you at your goal?*" which is subsequently recast as "*AYG*". Four trials later (Dyad 8, Trial 10), the dyad has developed a much richer system, using *"AMG* "to mean "*At my goal*" and "*AYS*" in Line 12 to ask the question "*Are you at your switch?*", as well as "*GC"* in Line 14 to mean "*gates are clear*". Of central interest is that checks ("*AYS"),* and statements of being at a particular location ("*AMG*") both become integrated into the same system of "moves in an activity".

It is perhaps surprising that, in a task that can be solved in a few steps, participants develop (subtly) different ways, not simply of solving the high-level task structure, but also of coordinating how the activity unfolds, e.g. "*AYS*" and "*CG*" in Dyad 8, vs. "*open?*", "*goal?*", "*exit?*", "*done*" of dyad 4. These have different sequential imports that depend on the specific interactional histories of each dyad.

A simple analogue is the utterance "*check*" in a chess game, which is as much a move as physically moving a chess piece. Similarly in the maze game uttering "*AYS*" and opening or closing the other's gates both constitute moves in the activity.

Note that the contraction seen in “*AYS*” is distinct from the contraction observed in spatial descriptions. Moreover, since these forms are introduced explicitly as a convention, and then subsequently adopted and used successfully, this suggests they are stronger, more normative conventions.

5.4. Accounting for procedural coordination

Accounting for procedural coordination faces similar problems to semantic coordination: the more coordinated the dialogues, the less structure there is on the conversational surface, and the conventions also change during the interaction.

Further complicating matters is that procedural coordination is underpinned by complementary structures. Consider Dyad 4, Maze 10 which has reached ceiling levels of coordination. The dyad solves the maze in a sequence consisting solely of three terms: “open”, “trapped” and “home”. Each turn performs a complementary “next relevant contribution” (Clark, 1996). So, although participants have converged on a very small set of routines, their successful, coordinated use involves NO immediate, local, turn-by-turn repetition of surface structure. From this perspective, once high levels of coordination have been achieved, any increase in local, turn-by-turn repetition of structure could be indicative of a *decrease* in forward momentum, and consequently be indicative of a *decrease* in coordination.

This raises the bar for accounting how coordination is established, as any account must show how systematic differentiation of turns develops as the surface structure becomes progressively elided. The simple surface form obscures many layers from previous iterations, and consequently the same word, e.g. "*open*" acquires a very different meaning at the end of the task than at the start. Thus long-term repetition between the start and end of the interaction is different from short term repetition of structure at low vs. high levels of coordination..

Finally, as shown in Dyad 9, Maze 10, highly coordinated participants can unproblematically interleave activity-specific utterances with everyday conversation. This raises the intriguing possibility that highly coordinated task-oriented dialogue should exhibit patterns of repetition that are comparable to those of everyday conversational interaction.

6. Putting the two together

Wittgenstein famously exhorted that the meaning of a word is given by its use within a language game, stating that "an intention is embedded in a situation" (Wittgenstein, 1958, PI 337). The transcripts show how interlocutors rapidly embed referring intentions and intentions associated with coordinating how the activity unfolds. In semantic and procedural coordination, dyads use the same words in different ways due to having developed different language games for solving the mazes. Even within dyads, the same words acquire meanings that differ radically from their meanings at the start of the interaction.

The data show that procedural function and reference become intrinsically linked. In much the same way that it is possible to ask someone to open a door by saying either "open?" or "door?", highly coordinated dyads develop conventions that either use terms associated with the referents or the routines, e.g. using *"G5"* in Dyad 9, Maze 10, Line 20 or "*trapped*" in Dyad 4, Trial 10, Line 4 to instruct the other participant to traverse a switch. These different coordination solutions that crystallize either referentially or procedurally can be arrived at via very different trajectories, yet fulfill an equivalent communicative function. It is an open question which communicative pressures result in either form of convention.

Moreover, within each dyad, participants often use different terms to refer to the same maze locations if the reference is embedded within a turn that has a different conventionalized procedural function. In the original maze game studies, Pickering and Garrod (2004) found that when switching to a different semantic model with different counting conventions, participants would use different names for the same referent, example, e.g. switching from "*the second **row** down from the top*" to "*the third longest **line***". A similar phenomenon occurs with procedural terms, see for example in Dyad 7, Trial 10. Here, participants use "*home*" and "*exit?*" to refer to exactly the same location (Both refer to the crosses in Figure 1 which are the goal locations that participants need to be on to exit the maze). Here, "*home*" means something akin to "*I'm on my goal, can you get to yours?*". This is then followed, in Line 8, with a question "*exit?*", which is a request for the location of the goal, i.e. “*where is your exit?*”. The form of the referring expression for exactly the same referent depends on the particular routine in which it is embedded.

6.1. Interleaving unconstrained dialogue with a joint activity

Let us return to the myriad ways in which dialogue is seamlessly interwoven with everyday activities, e.g. conversing while buying items in a shop or while walking down the street with a friend. These examples of everyday, naturalistic, unconstrained interaction might appear to bear little resemblance to the confined and highly structured maze task (or indeed task oriented dialogue in general). However, unconstrained conversational interaction in everyday activities depends intrinsically on interlocutors already being sufficiently skilled at coordinating how the activity unfolds, allowing the conversation to be interleaved with activity-specific actions and utterances. By contrast, the primary focus of dialogue between unskilled participants would necessarily be on establishing coordination, curtailing open-ended conversation.

In this light, consider Dyad 9, Trial 10, which shows two participants engaged in unconstrained dialogue about where to eat, and whether to flirt with one of the staff. Without knowing how difficult it is to establish coordination in the maze task, this excerpt seems unremarkable. Notice here how the activity of solving mazes has receded into the background, how few contributions are concerned with the maze task, and how these contributions are seamlessly interwoven with an unconstrained, everyday, playful conversation. The transitions between conversing and solving the maze are unmarked. There are *no* overt signals for switching between the conversation and the activity of solving the maze. Compare the ease with which they are solving the maze with Dyad 1, Trial 1. There is barely any mention of what each turn is doing; the procedural function of each turn has disappeared from the conversational surface.

Arguably this transcript is more representative of a conversational interaction where it just so happens that they are simultaneously playing a maze game with each other. At this highest level of coordination, where interlocutors are able to seamlessly switch between conversation, activity and back again (and even play with the boundary between the two), the dialogue bears a strong resemblance to everyday conversation, say at a dinner table, between friends who joke and gossip while simultaneously passing plates around the table and proffering food to each other (Imagine replacing the spatial such as a3 or d5 with the names of various dishes, and questions such as "are you on X yet?” with "do you want more?").

Consider the question “g5?” in Line 20, or the question “salt?, asked at a dinner table. The answers to both questions are second pair parts of activity-specific adjacency pairs. Being able to successfully perform these adjacency pairs presupposes a background of having practiced multiple prior occasions of a joint activity, in which multiple coordination problems were encountered, resolved and conventionalized. Such prior coordination is intrinsic to being able to converse open-endedly in unconstrained everyday dialogue in joint activities.

7. Conclusion

The original maze task of Garrod et al. (1984; 1987) was designed to unproblematically elicit referring expressions from participants. However, it transpired that the referential coordination phenomena were much more complex than originally anticipated. Similarly, even though the task presents participants with a simple procedural coordination problem (as evidenced by the brevity of dialogues in the later stages), the interactive development of idiosyncratic elliptical procedural conventions is equally complex.

One of the basic issues this raises is methodological. In referential studies, patterns of interaction are typically taken as indexing the communicative difficulties associated with securing reference. The findings discussed here suggest that some of these patterns are primarily due to participants developing procedural coordination with each other during the task.

Further, the phenomena discussed here emphasize the importance of investigating the *development* of coordination between participants. Instead of treating conversational interaction as a flat "static" slice, what needs to be explained is how coordination is established and continues to be refined. Frequently studies engage participants in a "practice stage" which is subsequently excluded from analysis. The findings discussed here suggest that any model of dialogue must account for how coordination develops during this initial practice stage. Although more formal approaches to coordination often presuppose that moves in a joint activity such as request(x) or instruct(y) are somehow already given, there is no reason to suspect that participants have a full idea of what they or their partner are doing; initially in the practice stage, participants often require many interactive exchanges before establishing which act has in fact been performed.

To conclude, the picture of dialogue that emerges is that interlocutors do not have recourse to an Archimedean vantage point outside the vagaries of language and the joint activity from which error-free, successful communication can be guaranteed. However, interlocutors constantly adapt to each other via highly interactive forms of externalized inferencing, in order to resolve the semantic and procedural coordination problems associated with the activity. These solutions rapidly become conventionalized and continue to be refined tacitly during the interaction into idiosyncratic, highly efficient, possibly normative, vocabularies and routines, laying the foundation for unconstrained, naturalistic interaction.

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References

Anderson, A. H., Bader, M., Bard, E. G., Boyle, E., Doherty, G., Garrod, S., and Weinert, R. (1991). The HCRC map task corpus. *Language and speech*, *34*(4), 351-366.

Austin, J. L. (1962). *How to Do Things with Words*. Oxford University Press, Oxford.

Bakhtin, M.M. (1986). *Speech Genres and Other Late Essays* (ed. M. Holquist: trans. C. Emerson and M. Holquist). Austin, Texas: University of Texas Press.

Bangerter, A., and Clark, H. H. (2003). Navigating joint projects with dialogue. *Cognitive Science*, 27, 195-225.

Brennan, S. E., and Clark, H. H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology: Learning, Memory, and Cognition* , 22, 1482-1493.

Brennan, S. E., Galati, A., and Kuhlen, A. (2010). Two Minds, One Dialog: Coordinating Speaking and Understanding. *The psychology of learning and motivation, 53*, 301-344

Brown, J.S., Collins, A., and Duguid, P (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18 (1), 32-42.

Brown-Schmidt, S. and Tanenhaus, M.K. (2008). Real-time investigation of referential domains in unscripted conversation: A targeted language game approach. *Cognitive Science, 32*, 643-684.

Clark, H. H., and Schaefer, E. (1989). Contributing to discourse. *Cognitive Science*, 13:259–294.

Clark, H. H. (1996). *Using language*. Cambridge: Cambridge University Press

Clark, H. H., and Krych, M. A. (2004). Speaking while monitoring addressees for understanding. *Journal of Memory and Language*, 50(1), 62-81.

Conchiglia, G., Rocca, G.D., and Grossi, D. (2007). On a peculiar environmental dependency syndrome in a case with frontal-temporal damage: Zelig-like syndrome. *Neurocase*, iFirst, 1-5.

Enfield, N. J., and Sidnell, J. (2013). Language presupposes an enchronic infrastructure for social interaction. In D. Dor, C. Knight, & J. Lewis (Eds.), The social origins of language: Studies in the evolution of language. Oxford: Oxford University Press.

Ferreira, V., and Bock, K. (2006). The functions of structural priming. Language and Cognitive Processes, 21(7-8), 1011-1029.

Fusaroli, R., et al., (2013) Dialogue as interpersonal synergy. This Issue.

Fusaroli, R., Bahrami, B., Olsen, K., Frith, C. D., Roepstorff, A., and Tylén, K. (2012). Coming to terms: an experimental quantification of the coordinative benefits of linguistic interaction. *Psychological science*, 23(8), pp. 931 – 939.

Galantucci, B. (2005). An experimental study of the emergence of human communication systems. *Cognitive Science: A Multidisciplinary Journal*, 29(5), 737–767.

Gann, T.M., Barr, D.J. (2012, in press) Speaking from experience: Audience design as expert performance *Language and Cognitive Processes*

Garrod, S. (1999). The challenge of dialogue for theories of language processing. In Garrod, S. and Pickering, M., editors, *Language Processing*. Hove: Psychology Press.

Garrod, D., Anderson, A., and Sanford, A. (1984). Semantic negotiation and the dynamics of conversational meaning. Technical Report 1, Glasgow Psychology Technical Report.

Garrod, S. and Anderson, A. (1987). Saying what you mean in dialogue: a study in conceptual and semantic coordination. *Cognition*, 27:181–218.

Garrod, S. and Doherty, G. (1994). Conversation, coordination and convention: an empirical investigation of how groups establish linguistic conventions. *Cognition*, 53:181–215.

Garrod, S. (1999). The challenge of dialogue for theories of language processing. In Garrod, S. and Pickering, M., editors, *Language Processing*. Hove: Psychology Press.

Garrod, S., Fay, N., Lee, J., Oberlander, J., and MacLeod, T. (2007). Foundations of Representation: Where Might Graphical Symbol Systems Come From? *Cognitive Science: A Multidisciplinary Journal*, 31(6), 961–987.

Ginzburg, J. (2012). *The interactive stanc*. Oxford University Press. Oxford.

Goodwin, C. (1994). Professional vision. *American Anthropologist*. 96(3), 606-633.

Gregoromichelaki, E., Cann R. and Kempson, R. (to appear 2013). "Coordination in dialogue: subsentential speech and its implications" In: Goldstein, L. (ed.) Brevity Oxford University Press.

Gregoromichelaki, E., Kempson, R. and Cann, R. (2012). "Language as tools for interaction: Grammar and the dynamics of ellipsis resolution" The Linguistic Review, Vol. 29, No. 4, 563-584.

Healey, P. G. T. (1997). Expertise or expert-ese? the emergence of task-oriented sub-languages. In *Proceedings of the 19th Annual Conference of the Cognitive Science Society*, Stanford, California.

Healey, P., Purver, M., King, J., Ginzburg, J., and Mills, G. (2003). Experimenting with clarification in dialogue. In *Proceedings of the 25th Annual Meeting of the Cognitive Science Society* (pp. 539-544).

Healey, P.G.T. 2004. "Dialogue in the degenerate case?" Peer Commentary on Pickering and Garrod: 'The Interactive Alignment Model'. *Behavioral and Brain Sciences,* 27(2) p. 201.

Healey, P.G.T., and Mills, G. J. (2006). Participation, Precedence and Co-ordination in Dialogue . In *Proceedings of the 28th Annual Conference of the Cognitive Science Society*. Vancouver. Canada

Healey, P. G. T., Swoboda, N., Umata, I., and King, J. (2007). Graphical Language Games: Interactional constraints on representational form. *Cognitive Science: A Multidisciplinary Journal*, 31(2), 285–309.

Healey, P. G. T., Purver M., and Christine Howes. (2010). Structural Divergence in Dialogue. In Proceedings of *Architectures and Mechanisms for language processing*, York, UK, September 2010.

Heath, C., and Luff, P. (1992). *Journal of Computer Supported Cooperative Work,* Vol. 1, No. 1. pp. 24-48. 1992. Collaboration and Control: Crisis Management and Multimedia Technology in London Underground Line Control Rooms.

Heritage, J. (1984). Garfinkel and Ethnomethodology. Cambridge: Polity Press

Heritage, J., and Raymond, G. (2005). Navigating epistemic landscapes: Acquiescence, agency and resistance in responses to polar questions. In J.-P. de Ruiter (Ed.), *Questions.* Cambridge University Press.

Heritage, J. (2012). 'Epistemics in action: action formation and territories of knowledge', *Research on Language & Social Interaction* 45(1), 1-29

Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, Mass.: MIT Press.

Jefferson, G. (1987). On exposed and embedded correction in social interaction. In Button, G. and Lee, J. R. E., editors, *Talk and Social Organisation*, pp. 86–100. Multilingual Matters, Philedelphia.

Kendon, A. (1976). The f-formation system: Spatial-orientational relations in face to face interaction. *Man Environment Systems*, *6*, 291-296.

Kecskes, I., and Mey, J. L. (2008) *Intention, Common Ground and the Egocentric Speaker-Hearer.* Mouton Series in Pragmatics 4.

Krauss, R. M. and Fussell, S. R. (1996). Social psychological models of interpersonal communication. In Higgins, E. and Kruglanski, A., editors, *Social Psychology: Handbook of Basic Principles*, pages 655–701. Guildford Press, London.

Krauss, R. M. and Weinheimer, S. (1966). Concurrent feedback, confirmation and the encoding of referents in verbal communication. *Journal of Personality and Social Psychology*, 4 (3), 343–346.

Larsson, S. (2007). Coordinating on ad-hoc semantic systems in dialogue. In *Proceedings of DECALOG*

Lave, J., and Wenger, E. (1991). Legitimate peripheral participation in communities of practice. In Lave, J. and Wegner, E., Situated Learning: Legitimate Peripheral Participation (pp. 91-117). Cambridge: Cambridge University Press.

Levinson, S. C. (1983) *Pragmatics.* Cambridge university Press, Cambridge, UK.

Levinson, S. C. (1992). Activity types and language. In Drew, P. , and Heritage, J. (Eds.), Talk at work: Interaction in institutional settings (pp. 66-100). Cambridge University Press

Linell, P. (2010). Communicative activity types as orgainisations in discourses and discourses in organisations. Discourses in Interaction, edited by Sanna-kaisa Tanskanen,

Marja-llisa helasvuo, Marjut Johansson and Mia Raitaniemi, Amsterdam / Philedelphia: John Benjamins.

Louwerse, M. M., Dale, R., Bard, E. G., and Jeuniaux, P. (2012). Behavior matching in multimodal communication is synchronized. *Cognitive Science*. 36(8): pp1404-26

Mills, G. J. (2007). Semantic coordination in dialogue: the role of direct interaction. PhD Thesis. Queen Mary University of London.

Mills, G. J. and Healey, P. G. T. (2006). Clarifying spatial descriptions: Local and global effects on semantic coordination. In *Proceedings of the 10thWorkshop on the Semantics and Pragmatics of Dialogue*.

Mills, G. J, and Healey, P. G. (2008). Semantic negotiation in dialogue: the mechanisms of alignment. In *Proceedings of the 9th SIGdial Workshop on Discourse and Dialogue* (pp. 46-53). Association for Computational Linguistics.

Mills, G. J. and Healey, P. G. T. (2013). The Dialogue Experimental Toolkit. In prep.

Newman-Norlund, R. D., van Schie, H. T., van Zuijlen, A. M. J., and Bekkering, H. (2007). The mirror neuron system is more active during complementary compared with imitative action. *Nature Neuroscience*, 10, 817–818.

Pickering, M. J. and Garrod, S. (2004). Towards a mechanistic psychology of dialogue. *Behavioural and Brain Sciences*, 27(2):169–190.

Purver, M., Ginzburg, J. and Healey, P. (2002) On the means for clarification in dialogue. In: *Advances in discourse and dialogue,* ed. J. van Kuppevelt and R. Smith. Kluwer. Available at: http://www.dcs.kcl.ac.uk/pg/purver/publications.html.

Reitter, D., Moore, J. D., and Keller, F. (2006). Priming of syntactic rules in task-oriented dialogue and spontaneous conversation. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society* (pp. 685-690). Vancouver, Canada.

Riley, M. A., Richardson, M. J., Shockley, K., and Ramenzoni, V. C. (2011). Interpersonal synergies. *Frontiers in psychology*, *2*, 38.

Saxton, M. (1997). The contrast theory of negative input. Journal of Child Language, 24, **1997**, *24*, 139-161.

Schank, R. C., and Abelson, R. P. (1977). *Scripts, plans, goals, and understanding.* Hillsdale, N.J.: Erlbaum.

Schegloff, E. A. (1992). Repair after next turn: The last structurally provided defense of intersubjectivity in conversation. *American Journal of Sociology*, 97(5):1295–1345.

Scribner, S. (1986). Thinking in action: Some characteristics of practical thought. In Sternberg, R. J. and Wagner, R. K. (Eds.), Practical intelligence: nature and origins of competence in the everyday world (pp. 13-30). New York: Cambridge University Press.

Schegloff, E. A. and Sacks, H. (1973). ‘Opening up closings’, Semiotica 8: 289-327.

Schegloff, E. A. (1996). Confirming allusions: Toward an empirical account of action. *American Journal of Sociology*, *104* , 61-216.

Schegloff, E. A. (1998). "Body Torque." *Social Research*, 65 (3), 1998, 535-596.

Schegloff, E. A. (2007). *Sequence organization in interaction: Volume 1: A primer in conversation analysis*. Cambridge University Press.

Schegloff, E. A. (2011). Word repeats as unit ends. *Discourse Studies*, *13*(3), 367-380.

Schlangen, D. (2004, April). Causes and strategies for requesting clarification in dialogue. In *Proceedings of the 5th SIGdial Workshop on Discourse and Dialogue* (pp. 136-143).

Schober, M.F., and Carstensen, L.L. (2010). Does being together for years help comprehension? In Morsella, E. (Ed.), *Expressing oneself/Expressing one's self: Communication, cognition, language, and identity* (pp. 107-124). London: Taylor & Francis.

Schwartz, D. L. (1995). The emergence of abstract representations in dyad problem solving. *Journal of the Learning Sciences*, 4(4):321–354.

Searle, J. R. (1969). *Speech Acts*. Cambridge University Press, Cambridge.

Sebanz, N., and Bekkering, H. and Knoblich, G. (2006). Joint action: bodies and minds mooving together. *TRENDS in Cognitive Sciences.* Vol.10 (2).

Simon, N. (1975). Echolalic speech in childhood autism. Consideration of possible underlying loci of brain damage. *Arch. Gen. Psychiatry* 32 (11): 1439–46. PMID 812450.

Steels, L. (2003). The evolution of communication systems by adaptive agents. In *Adaptive Agents and Multi-Agents Systems*, (pp 125–140). Springer Verlag.

Steensig, J., and Drew, P. (2008). 'Introduction: questioning and affiliation/ disaffiliation in interaction', *Discourse Studies* (10) 5-15.

Stivers, T., and Robinson, J. D. (2006). A preference for progressivity in interaction. *Language in Society*, *35*(03), 367-392.

Sterponi, L., and Fasulo, A. (2010) *How to go on: intersubjectivity and progressivity in the communication of a child with autism.* Ethos, 38 (1). pp. 116-142. ISSN 0091-2131

Wittgenstein, L. (1958). *Philosophical Investigations*. Blackwell, Oxford.

Appendix

Dyad1. Trial 1.

Participant1	1	Babs
Participant1	2	me navigating and you driving
Participant1	3	oh no
Participant2	4	oh no@
Participant1	5	When do we start
Participant2	6	NOW
Participant1	7	lemme direct you to my switch?
Participant2	8	okey pokey
Participant1	9	look at the third row up and second to the end block
Participant1	10	i am, from the top, 2 across and down one
Participant2	11	so the middle block?
Participant2	12	of the third row
Participant2	13	???
Participant1	14	nah
Participant1	15	start counting from the bottom
Participant2	16	think rows and block numbers from left to right
Participant1	17	6 along three up
Participant2	18	rows from the top!
Participant1	19	from bottm
Participant2	20	why make it more complecated!
Participant1	21	just do it
Participant2	22	row:? block?
Participant1	23	ok atrat again
Participant2	24	i dnt no what ur saying dunb bum
Participant1	25	start again
Participant2	26	ok
Participant2	27	row and block?
Participant1	28	if you look at the screen
Participant2	29	im looking...
Participant1	30	then look at the bottom left block
Participant1	31	then count in a normal graph/grid fashion
Participant1	32	regardless of the maze
Participant2	33	OMG!
Participant2	34	why so comlicated!
Participant1	35	count 6 along reading frm left to right
Participant1	36	then three up
Participant2	37	ROW!
Participant2	38	THEN BLOCK NUMBER!
Participant1	39	cant you understand my directions?
Participant2	40	NO
Participant2	41	ill direct
Participant1	42	ok its row three from the bottm
Participant2	43	my first switch...
Participant1	44	ok
Participant1	45	ok
Participant2	46	row 4
Participant2	47	3rd block across
Participant1	48	from bottom?

Participant2	49	NO DUMB BUM i already told you, from the TOP
Participant1	50	ok
Participant2	51	like normal people
Participant2	52	are you there?
Participant1	53	row 4 has three blocks
Participant2	54	yes! well done
Participant1	55	the third one across?
Participant1	56	i have a gate before it
Participant2	57	have you done it?
Participant1	58	knob
Participant2	59	ok
Participant2	60	the other switch is...
Participant2	61	7th row,
Participant2	62	3rd block across
Participant2	63	YAY!
Participant1	64	im there
Participant2	65	im at my goal!
Participant2	66	where's ur switch now,
Participant2	67	USING ENGLISH
Participant1	68	now you got to go to my switch u selfish cow
Participant2	69	shut up bitch
Participant1	70	from the top
Participant2	71	if we were doing it your way, we wouldnt even be here!
Participant1	72	5 rows down
Participant1	73	there are 6 on that row
Participant1	74	its the 5th
Participant1	75	reading from L to R
Participant2	76	is it open?
Participant1	77	no
Participant2	78	wheres the other switch?
Participant1	79	only one switch
Participant2	80	just type row and block
Participant2	81	just two numbers cant be that hard
Participant1	82	from the top its the 5th row yeah
Participant2	83	row 5
Participant2	84	.....
Participant1	85	then it the 5th out of six
Participant1	86	on that row
Participant2	87	I HAVE gone over that switch ALREADY!!!!!!!!!!!!!!!!!!!!!!
Participant2	88	where is your other damn switch!!!!!
Participant1	89	only one switch u prat
Participant1	90	listen and stop trying to b awkward
Participant2	91	row 5, block 5?
Participant1	92	its block 5 out of 6 yeah
Participant1	93	?
Participant2	94	im doing that!
Participant2	95	its not working
Participant1	96	it went away and tehn came back
Participant2	97	there now?
Participant1	98	you walked past it
Participant2	99	there?
Participant1	100	yay
Participant2	101	I WAS RIGHT THERE
Participant1	12	what did you do diff
Participant2	103	nothing

Dyad 1. Trial 5.

Participant2	1	switches...
Participant1	2	1,1 and 7,2
Participant1	3	that it
Participant2	4	this ones more complicated
Participant2	5	where are ur gates
Participant1	6	there at the barrier of 4,1
Participant1	7	and 5,1
Participant2	8	is that it?
Participant2	9	and ur goal
Participant1	10	and 6,4 and 7,2
Participant1	11	my goal is 2,1
Participant2	12	can you get to 3,1 and stay there please
Participant2	13	and now to ur goal

Dyad1. Trial 11.

Participant1	1	2,2 4,1 6,2
Participant2	2	go to 2,1 please
Participant1	3	ther
Participant2	4	and now to ur goal
Participant1	5	ther
Participant2	6	shit
Participant2	7	back to 2,1
Participant1	8	ther
Participant2	9	now to the goal

Dyad3. Trial 3.

Participant9	1	ok wait
Participant9	2	say all your switches
Participant10	3	i have a one switch
Participant10	4	it is the third row from the top
Participant9	5	cant reach it
Participant10	6	ok where is urs
Participant9	7	mine : 1 - second colmn - bottom
Participant10	8	now ?
Participant9	9	on the right
Participant9	10	no
Participant10	11	second column ?
Participant9	12	second colomn from right
Participant9	13	very bottom
Participant10	14	cant reach it
Participant9	15	ok. the very top
Participant9	16	on the lesft col
Participant9	17	good
Participant9	18	at the goal
Participant10	19	now u need to go to the third row
Participant10	20	u had it
Participant9	21	what colmn?
Participant10	22	last column from the right
Participant10	23	third row
Participant9	24	now?
Participant10	25	no
Participant10	26	thir row from the top
Participant9	27	1st colm on the right?!
Participant10	28	last column
Participant9	29	now
Participant10	30	yes

Dyad 4. Trial 8.

Participant1	1	5,4
Participant1	2	6,6
Participant2	3	3,1; 3,6; 5,2
Participant2	4	Give me all urs
Participant1	5	That’s it
Participant2	6	If I do nothing it means I cannot get there

Dyad 4. Trial 10.

Participant1	1	3,7 … 5,4
Participant2	2	5,1 …. 7,6
Participant2	3	open
Participant1	4	trapped
Participant2	5	open
Participant2	6	home

Dyad 4. Trial 12.

ParticipantA	1	3,1..5,6
ParticipantB	2	4,2 5,4
ParticipantB	3	open
ParticipantB	4	home
ParticipantA	6	Me now
ParticipantA	7	home

Dyad 5. Trial 1.

Participant5	1	so go back to the switch
Participant6	2	do weat u did b4 man
Participant5	3	gey to the switch
Participant6	4	do wat u did b4
Participant5	5	is it open
Participant6	6	no still closed
Participant6	7	do wat u did b4
Participant5	8	now?
Participant6	9	no
Participant5	10	tell me when

Dyad 6. Trial 1.

Participant26	1	oi
Participant25	2	my gate is closed now, is urs open
Participant25	3	i dont get it
Participant26	4	is ur gate b4 that?
Participant25	5	urs open now
Participant25	6	?
Participant26	7	look in the sequence is you gate b4 e6?
Participant26	8	coz den i let u fru 1st den ill follow
Participant25	9	my gate is my gate is b/w c 3 and c4
Participant25	10	its closed now
Participant25	11	is urs open
Participant25	12	is urs open damit
Participant26	13	yeh

Dyad 7. Trial 1.

Participant50	1	dude
Participant40	2	Hello there!
Participant50	3	u go first, where do u need me to go?
Participant40	4	I have a gate to the last column
Participant40	5	theres only one box there
Participant50	6	open?
Participant40	7	no
Participant50	8	left, right or down?
Participant40	9	if the left column is onr
Participant40	10	*one
Participant50	11	open?
Participant40	12	then i want you to go to 7
Participant50	13	7 what?
Participant50	14	this is gonna take a while
Participant40	15	lol dude listen
Participant40	16	right take note
Participant50	17	ok
Participant40	18	top left is 1,1
Participant50	19	ok
Participant50	20	so like chess
Participant40	21	bottom right is 7,7
Participant40	22	yes
Participant50	23	ok
Participant50	24	so where do u need me?
Participant40	25	i want you to go to 7,3
Participant40	26	7 is x axis
Participant40	27	3 is y-axis
Participant50	28	open??
Participant40	29	got it?
Participant50	30	yup
Participant40	31	i am there
Participant50	32	ok next?
Participant40	33	i am in my goal
Participant40	34	woohoo
Participant40	35	where do i go?
Participant50	36	ok i need u to go to..1,7
Participant50	37	goal!
Participant40	38	open sesame?

Dyad 7. Trial 10.

Participant40	1	7,7
Participant50	2	blocked
Participant40	3	3,3
Participant40	4	you are so slow
Participant40	5	yawn
Participant40	6	home
Participant50	7	shut up, im doing my best
Participant40	8	exit?
Participant40	9	/...
Participant50	10	6,3
Participant40	11	switch?
Participant50	12	i need 3,7 7,7 or 6,4
Participant50	13	go back

Dyad 8. Trial 6

Participant16	1	1.2 and 3.7 and 7.6
Participant17	2	5,1 and 1,4
Participant17	3	can u reach mine
Participant17	4	??
Participant16	5	ATG-at your goal
Participant16	6	ATG?
Participant17	7	huh
Participant16	8	AYG-at your goal
Participant17	9	no im not i need u to open my gate
Participant17	10	lol
Participant17	11	ok u ATG
Participant16	12	lol

Dyad 8. Trial 10

Participant16	1	lol how many more?
Participant17	2	4,1 3,5
Participant17	3	i dunno lol
Participant17	4	im havin fun
Participant16	5	2.5 and 3.2 and 6.7
Participant17	6	:)
Participant17	7	there ya go
Participant16	8	wheresd yours?
Participant16	9	through my gate
Participant16	10	AMG lol
Participant17	11	4,1 and 3,5
Participant16	12	AYS
Participant17	13	nope u sure
Participant17	14	GC
Participant17	15	GO
Participant16	17	AYS
Participant17	18	AMG

Dyad 9. Trial 10.

Participant92	1	we did it again
Participant80	2	ooops we did it again
Participant92	3	that means less nandos from todays earnings
Participant80	4	a3, d5
Participant92	5	only 14 quid maan
Participant80	6	damn i want more nandos !!!!!!
Participant92	7	we shud come back in diguise
Participant80	8	remember that chick from nando's
Participant80	9	that really cute one,
Participant92	10	b7 and g5
Participant80	11	a3 or d5 mate
Participant92	12	haha
Participant92	13	yea
Participant92	14	well
Participant92	15	go fer her mate
Participant92	16	she needs u
Participant92	17	:D
Participant80	18	I cant get to either
Participant80	19	the X .. or the chick :P
Participant80	20	g5 ?
Participant92	21	chick maan
Participant92	22	X aint gonna
Participant92	23	get u nething
Participant92	24	dude
Participant80	25	are u on X yet ?
Participant92	26	if we make it one hour and one min
Participant92	27	we get paid for the extra one min effort lol
Participant92	28	so go for it
Participant80	29	we're already been here for over an hour
Participant92	30	hahaha
Participant80	31	are you on X ?