

Suspending and Reinstating Collaborative Activities

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Suspending and reinstating collaborative activities

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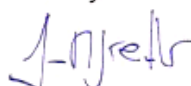
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à mon grand-père,

*“Oh, I could spend my life having this conversation.
Look, please, try to understand before one of us dies”*

John Cleese (Monty Python)

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Abstract

There is an interest in how people coordinate multiple activities with multiple partners, and in particular, how people deal with interruptions. Interruptions happen unexpectedly. They can cause errors and loss of productivity. Effects of interruptions have been studied in individual tasks, but not in collaborative tasks. When pairs deal with an interruption, they have to jointly suspend their activity, address the matter, and later jointly reinstate their activity.

The main goal of the dissertation was to define a model of suspensions and to measure constraints on the suspension and the reinstatement steps. Pairs suspend momentarily without taking leave of each other. This requires the coordination of two important processes: Politeness and common ground. First, politeness is often involved in suspensions, because asking one's partner to wait while one does something else is face-threatening. Two factors affect politeness: The degree of personal responsibility of participants proposing suspensions and durations of suspensions. Second, continuing tasks requires reconstructing joint representations of the tasks (common ground). Several factors affect the reconstruction of common ground: The persons interrupted the timing of suspension and the availability of cues about the state of the task.

Five studies were conducted. Study 1 used naturally-occurring suspensions in telephone conversations from a corpus data. Study 2 & 3 used suspensions triggered with a cover story in laboratory. Study 2 & 3 manipulated participants' roles in conversations and durations of interruptions. Results revealed that participants were more polite when suspension lasted longer, and it took more collaborative effort to reinstate conversations. Also, initiators of suspensions were more polite when they were listening than speaking. Study 4 & 5 manipulated the duration and the timing of interruptions during a goal-oriented task. Additionally, Study 4 manipulated the participants' role during interruptions, and Study 5 manipulated the visibility of workspace between participants. Results showed that participants took more time to reinstate tasks when interruptions lasted longer and when it happened in the middle of sub-tasks, compared to when interruptions were brief and happened between sub-tasks. Also, they took more time to reinstate when both participants were distracted during interruptions, rather than when just one was distracted, and when participants did not share their workspace, rather than when they did share a workspace.

Keywords:

Collaborative activities, language, conversation, dialogue, interruption, suspension, reinstatement, politeness, common ground, duration, conversational roles, visibility, cues.

Mot clés:

Activités coopératives, communication, langage, conversation, dialogue, interruption, suspension, réinstauration, politesse, terrain commun, durée, rôles conversationnels, visibilité, indices.

Introduction

In this project, I try to answer an empirical question: How do people suspend their mutual activities when they are interrupted by a third party?

What are suspensions? Let's look at the following example: Marc, a car dealer, and Lydia, a customer, are sitting in Marc's office. They are negotiating options on the car, when Marc's telephone rings. Marc answers the call. In the meantime, Lydia waits. When he is done, Marc and Lydia return to their negotiation. In this example, two people are involved in a conversation. A third party solicits one person's attention and as a result, it interrupts the conversation. This constrains both persons to momentarily suspend their activity.

Interruptions take place anywhere and happen to anybody: at home, a child needs a mother's attention while she is talking on the telephone; at work, a boss calls an employee while that person is working on a project with a colleague; in a restaurant, the waiter comes to take the order from a couple involved in a romantic discussion. All these examples have something in common. People are involved in an interaction, and they are interrupted. Therefore, they need to coordinate each others' actions to accommodate to the unexpected situation.

Interruptions stem from the need of several individuals to interact to coordinate a mutual problem. This can be looked at macro and micro levels. At a macro level, people live together, they organize common activities, or they trade goods and services. People go about their personal business, but they are also interdependent of one another. So at times, they interrupt each other. At a micro level, people use language to coordinate mutual actions. People negotiate interactions one at a time. So when people solicit attention of other people who already involved in an interaction, it creates an interruption. We will have a closer look at these levels as we address coordination of suspensions.

The dissertation is organized in the following way: In the chapter 1, I address issues related to fragmented activities in organizations. I propose a view of interruptions as coordination of situated and distributed cognition. In the chapter 2, I present issues related to interruptions of individual activities. In the chapter 3, I present conversational analysis and a collaborative activities framework as conceptual tools to understand suspensions of interactions. In the chapter 4, I develop research questions and propose a research plan. Chapters 5, 6, and 7 are three original manuscripts reporting the results of 5 studies. Then, in

chapter 8, I summarize results, discuss their implications, address limitations and propose further avenues for research.

Chapter 1 – Interruptions in organizations

Research suggests that the more organized activities are, the more interdependencies will be created, the more coordination needs will occur, and the more likely interruptions will happen. Such an environment is typical of organizations.

1.1 Coordination and interdependencies in organizations

When many people work for the same purpose, they need to coordinate activities. Coordination is a central problem in management theories (e.g., Taylor, 1911). When organizations grow, they differentiate labor and activities (Mintzberg, 1983). The division of tasks then requires coordination among tasks. Mintzberg (1983) proposes 5 types of coordinating mechanisms: mutual adjustment; direct supervision; standardization of work processes, standardization of work output, and standardization of work skills. These mechanisms hold organizations together. The simplest coordination mechanism is mutual adjustment. It is the simplest in terms of structure and means that need to be organized. Mutual adjustment is an informal communication process. It is usually what coworkers use to get their work done. It is the most flexible mechanism and it depends very much on the participants' ability to adapt to each other. It is also that way that people interrupt each other. Beyond formal structure, it is the main mechanism people use to deal with unexpected needs. Then as the organization outgrows a handful of people working together, more formal coordinating mechanisms emerge, such as the need to supervise and take responsibility for the division of labor. Then, still later, mechanisms emerge that involve standardization of work processes, outputs and skills. Organizations can specify how tasks need to be achieved (e.g., assembly lines). They can specify the output of the work (e.g., products or services). They can also specify skills or knowledge employees need to master to perform work (specialized training). These organizations are structured. Such structures create work constellations and flows of communication. Communication can be both vertical and horizontal, and both formal and informal.

The fragmentation of tasks and responsibilities creates interdependent activities, and thus, the need for coordination and communication (Malone & Crowston, 1994). Each interdependent activity consists of actors, resources and goals that need to be managed. The coordination problem for each actor depends on task and resources availabilities. There are processes to achieve activities and processes to manage dependencies. But there is also a

process of integrating fragmented activities (Heath & Staudenmayer, 2000). The most common way to manage these coordination needs is on-going communication. This has long since been described in managerial activities. Managers deal with a series of fragmented actions and have frequent interactions (Mintzberg, 1973; Sproull, 1984). But what was once particular to top management has become more generalized in flattened structures. There, employees work more in teams, with numerous partners and on varied activities (DiMaggio, 2001; Perlow, 1999; Sproull, 1984). Such (ad hoc and decentralized) structures have emerged with new communication technologies (Malone & Crowston, 1994). These technologies reduce costs of coordination among dependencies. As a result, these structures can sustain more flows of communication, but at the same time, they also increase the cost of unplanned coordination and communication (e.g., Perlow, 1999, Gonzales & Mark, 2004). This is because people can interact freely and more closely, and thus more interruptions occur (McFarlane & Latorella, 2002).

The balance between spontaneous communication and productivity of fragmented activities can be problematic. In an ethnographic study, Perlow (1999) coined the term “time famine” to describe engineers complaining about the lack of time to accomplish too much work. In this company, engineers were interacting frequently and they had trouble keeping up with their individual assignments. Their interactions helped them coordinate their projects, but they were taking place too often. Ninety-six percent of interactions were helpful, but only 10% were urgent. So, 86% of interactions could have happened later. Also, 95% of interactions were spontaneous and not controlled by the engineers. Perlow proposed that the engineers allocate specific periods of time for working alone (quiet time) and for interacting (interaction time). This resulted in minimal interruptions during quiet time and maximal coordination during interaction time. She proposed a model for an effective use of time. She suggests balancing spontaneous and synchronized times of interactions as a function of how frequent interactions are. The more frequent they are, the more synchronized they should be. In other words, interactions can be spontaneous, when they are infrequent, but when they become more frequent, interactions are more effective when they are synchronized.

1.2 Concepts of interactive and individual activities

Further studies (Fussell et al., 2004; Gonzalez & Mark, 2004, 2005) describe

interactive activities and individual activities. These activities are interdependent but need to be coordinated.

In Fussell et al. (2004), workers follow trajectories. Trajectories are sequences of activities where entities (person, team) move through time. Both participants and tasks have trajectories. Participant trajectories are related to a given person assigned to an activity in a project, and task trajectories are the evolution of given projects. The two trajectories are dependent and don't progress at the same pace. Usually trajectories will happen parallel to each other. But they need to be coordinated periodically. Because of the need to coordinate, workers prefer working with collocated partners. Collocated activities require less effort to coordinate than remote activities.

Similarly to trajectories, workers' activities can be considered as working spheres (Gonzalez & Mark, 2004). These are composed of units of tasks that serve the purpose of specific assignments. Workers principally collaborate to coordinate working spheres. Gonzalez and Mark (2004) found that workers spend on average 3 minutes on a task, before switching tasks. When these tasks are looked at the sphere level, workers spend on average 12 minutes before switching spheres. In another analysis, Gonzalez and Mark (2005) found that workers constantly maintain an overview of their activities, depending on their own activities and their colleagues. They monitor each other to figure out mutual progress and status of activities. These strategies help anticipating priorities and changing activities, both for local tasks and for global project. That way, workers filter incoming and outgoing information.

As these studies indicate, individuals and their environment can't be separated. They interact with each other. This view is shared in activity theory (Leont'ev, 1978, in Kuutti, 1995) and in distributed cognition (Hutchins, 1991). In activity theory, activities are composed of people, actions and motivating objects. They form a unit of analysis (spheres in Gonzalez and Mark (2005)). The environment provides objects that people use to coordinate and support activities (e.g., Kirsh, 2001; Kuutti, 1995). People can affect objects and form them according to their needs. But objects can also influence people's representations. This interaction with the environment was described by Vygotsky (1978) in his concept of zone of proximal development. He showed how children learn from their environment and from the interactions with their environment. He underlined the importance of integrating the environment to understand how individuals behave in given contexts.

We have seen that in an organizational setting, activities are fragmented and are therefore interdependent. People coordinate individual activities by communicating with each other. People are in constant interaction with their environment, whether it be another person or objects. The problem for people is to find ways to coordinate multiple interactions and activities. This is a problem, because individuals can't perform multiple activities at a given moment. We will see now how individuals perform activities and how they deal with interruptions.

Chapter 2 – Individual activities and interruptions

In this chapter, we will first look at what activities are, so we can better understand the implications for interruptions. Then, we will describe types of interruptions and look at their effects on individuals¹.

2.1 Performing activities

What do individuals do when they perform activities? According to action theory, individuals are motivated to attain goals (Miller, Galanter & Pribram, 1960). They control their actions until goals are met. This process is described in the TOTE (Test, Operate, Test, Exit) process (Miller, Galanter & Pribram, 1960). In action regulation theory (Frese & Zapf, 1994), actions are accomplished in two phases. In a pre-phase, individuals set goals and plan them, and in an action phase, individuals try to attain the goal. Then, they get feedback from the outcome of their actions. They can change their plan and the course of their actions to attain the set goals. These approaches assume individuals are goal-directed and can plan their actions in a hierarchical way.

Miyata and Norman (1986) describe a typology of activities (See Table 1). First, activities can be active or suspended. Then, current activities are either under control (foregrounded) or not (backgrounded). Foregrounded activities are in fact commonly named primary activities. They are activities individuals consciously focus their attention on. Backgrounded activities are used for on-going routine tasks, and usually receive little or no conscious attention (e.g., changing gears while driving a car). Backgrounded activities can also be external, and carried out by a system (e.g., a computer) or another person. Then there are suspended activities. In suspended activities, individuals' intentions remain active, but the activities remain on hold until an appropriate time to resume their execution.

¹ The term “individuals” refers to the ensemble of single persons who perform actions. They are not performing actions together, but individually.

Table 1. Types of activities.

Suspended	Current		
	Foregrounded (primary)	Backgrounded	
		Internal	External

Let's now turn to the process of interruptions and resumptions of primary activities. A generic process is proposed by Altmann and Trafton (2004). See Figure 1.

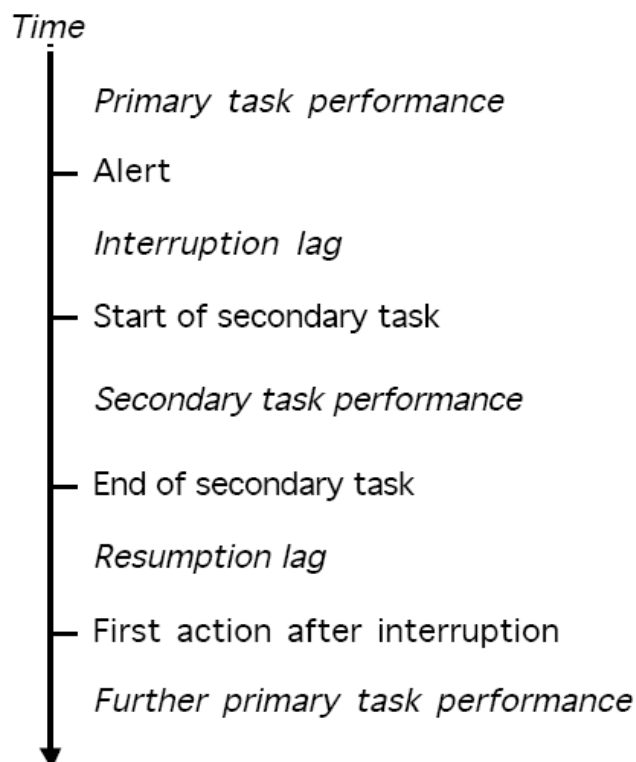


Figure 1. Punctuation of the transitions in an interruption, adapted from Altmann and Trafton (2004).

This model shows the transition from a primary activity to a secondary activity and later on, the transition back from the secondary activity to the primary activity. The time intervals used to move from an activity to another are called interruptions and resumption lags. Both primary and secondary activities can share the same properties. In Miyata and Norman's (1986) typology, every time individuals switch tasks, background activities become foreground activities and foregrounded activities are put in the background. This is because individuals can only focus their attention with full consciousness on one task at a time. This allows them to plan, control and assess their actions.

Individuals have a limited focus of attention. This limit challenges them when they

deal with interrupting events. Conflicts of attention arise when individuals need to concentrate on one task and they need to be alert for unexpected external events. According to Miyata and Norman (1986), individuals can be task-driven or interrupt-driven. The first state features a concentration process attending to a single purpose and ignoring other events (task-driven process) – e.g., a person reading a book. The second state features a response process to the environment. It involves changes of activities and thoughts (interrupt-driven process) – e.g., police officers monitoring car traffic. In the latter case, people are more easily distracted. Similarly, Hall (1983) distinguished monochronic and polychronic preference styles. People preferring the first style favor uninterrupted activities. People preferring the second style favor multiple activities and are more flexible regarding interruptions.

2.2 Types of interruptions

Let us now turn to types of interruptions. How do they take place? Jett and George (2003) describe four types of interruptions: breaks, intrusions, discrepancies and distractions (see Table 2).

Table 2. Four types of interruptions from Jett and George (2003).

Type	Internal / External	Planned / Unplanned	Forced on individual
Break	Internal	Planned	No
Intrusion	External	Unplanned	Yes
Discrepancies	Internal	Unplanned	No
Distractions	External	Unplanned	No

The first type of interruption is a break. Breaks are planned and originate from individuals (internal and foregrounded in Miyata and Norman's (1986) terminology). These are also called scheduled interruptions (McFarlane & Latorella, 2002), and natural transitions (Gonzalez & Mark, 2005). Natural transitions happen when tasks require no further action, and individuals move on to other activities.

The second type of interruption is an intrusion. Jett and George (2003) describe an intrusion as “an unexpected encounter initiated by another person that interrupts the flow and continuity of an individual’s work and brings that work to a temporary halt” (p. 495).

Intrusions are not planned and originate from the environment (external, also backgrounded in Miyata and Norman's (1986) terminology). They are often immediate (McFarlane & Latorella, 2002), their transitions are forced and disruptive (Gonzalez & Mark, 2005). Forced transitions typically happen when individuals have to leave activities they are focusing on. For instance, individuals are solicited by other people's presence or phone calls and require individuals to spend time with them on another activity. Intrusions are the type of interruption referred as interruptions in the literature on task interruptions. Intrusions are also the type of interruption we are interested in this research project.

The third type of interruption is a discrepancy. Discrepancies are unplanned and internal (foregrounded) in Miyata and Norman's (1986) terminology. There are inconsistencies between what individuals expect and what is relevant for tasks at hand. Discrepancies redirect individuals' attention to the inconsistencies, and prevent them to continue their tasks.

The fourth type of interruption is a distraction. Distractions are unplanned and external (background) in Miyata and Norman's (1986) terminology. They draw individuals' attention away from tasks. They are not aimed at individuals but nevertheless divert attention onto unrelated activities.

2.3 Effects of interruptions on individuals

In organizational settings, interruptions are perceived negatively. They happen too often or at a bad time (e.g., Perlow, 1999; Tucker & Spear, 2006; Coeira & Tombs, 1998). They affect individuals' productivity (Perlow, 1999), accuracy (e.g., Bainbridge, 1984; Flynn et al., 1999), and mood (Adamczyk & Bailey, 2004). For instance, Jackson, Dawson and Wilson (2003) showed that people opened new emails as fast as they would answer the telephone (less than 6 seconds). Then, they needed more time to resume their primary activities (2 minutes). Most advice is aimed at controlling the initiation and the timing of intrusions (Jett & George, 2003; Perlow, 1999; Jackson et al., 2003). But, as we have seen, exchanging information is critical to coordinate collaborations (Perlow, 1999, Fussell et al., 2004; Mark & Gonzalez, 2005). In fact, people often self-initiate interruptions (Gonzalez & Mark, 2004; Sproull, 1984), for instance, when putting their activities on hold to coordinate them with other people, or when using signals to remind themselves to do something else.

Few experimental studies show positive outcomes of interruption in activities. In fact,

the first experimental study on interruptions by Zeigarnik (1927) showed that people could recall interrupted tasks better than uninterrupted tasks. More recently, studies showed individuals increasing their performance when they were interrupted (Zijlstra, Roe, Leonora & Krediet, 1999; Speier, Valacich & Vessey, 1997; Eyrolle & Cellier, 2000). Secretaries took the same amount of time to complete interrupted tasks than those who were not interrupted, but their level of stress increased (Zijlstra, Roe, Leonora & Krediet, 1999). In other experiments (Speier, Valacich & Vessey, 1997, 1999, 2003; Burmistrov & Leonova, 2003), individuals were more accurate and faster after interruptions in simple tasks (retrieving information), but not in complex tasks (problem-solving). This task effect was stronger when interruptions were more frequent (Speier, Valacich & Vessey, 1999). These studies consider the outcome of interruptions on the overall performance of the primary tasks, but they don't study the actual processes of suspending and resuming activities.

In the task interruption literature, the focus is on cognitive costs for resuming suspended activities. Resuming activities is a cognitive process. It involves actions, attention and memory (Miyata & Norman, 1986). Those three facets are separate but intertwined processes. We treat them together and discuss the issues of resuming activities.

A basic finding is that intentions of suspended activities remain active, and await an appropriate time to resume their execution (Miyata & Norman, 1986). In a hierarchical analysis view (Miller, Galanter, & Pribham, 1960) and a means-end analysis view (Newell & Simon, 1972), individuals remember the suspended actions that remain to be done. In theory, incomplete tasks can be resumed, because unfulfilled goals remain on top of the stack. Structures of the tasks allow individuals to retrieve pending goals in a last-in first-out manner. But it is also assumed that goals can be actively inhibited and activated for the purpose of the intentions. During the accomplishment of tasks, goals can be suspended in order to accomplish sub-goals. Sub-goals can be part of one main goal or can be part of another goal. Overall, the activation of an internal representation is critical for task resumption (Altmann & Trafton, 2002).

This approach supposes an accurate memory of the last actions, so individuals can perform future actions. This memory for future actions is also known as prospective memory. Research shows that this memory decreases over time and when it faces interferences during interruptions (Altmann & Trafton, 2002; Hodgetts & Jones, 2005, 2006a, 2006b; Edwards, McDaniels, Williford, Pagan & Dismukes, 2003). In fact, it's the

activation of goals in memory that seem to decay over time (Hodgetts & Jones, 2005, 2006a, 2006b, Altmann & Trafton, 2002, 2007). According to Altmann & Trafton's (2002, 2007) goal activation model, the ability to retrieve goals depends on the level of activation at the onset of interruptions and on the level of interference in the meantime (Figure 2). Interferences such as complex tasks increase time to resume suspended goals. Complex tasks are more interfering because they involved numerous sub-tasks. These tasks have more effect on suppressing active goals in memory (Hodgetts & Jones 2006a).

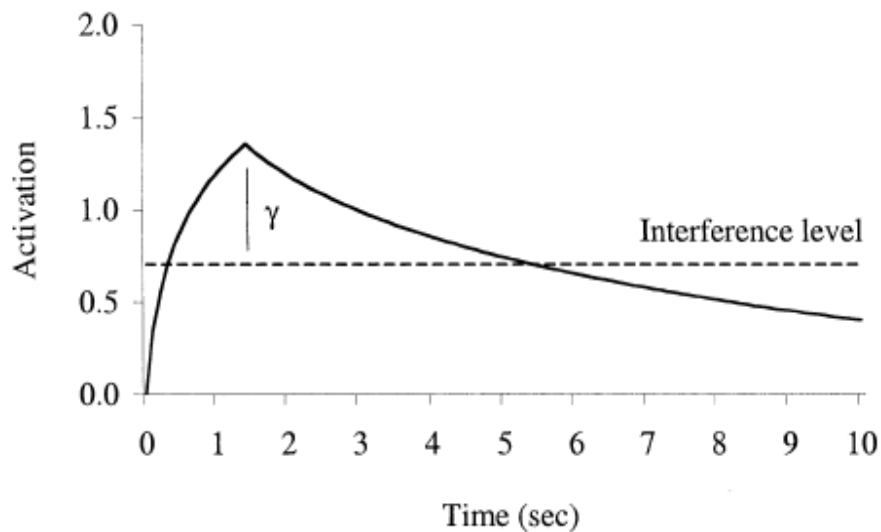


Figure 2. Level of activation of new goals as a function of time in seconds, and level of interference due to old goals. γ indicates the activation advantage of new goals over the interference of old goals (taken from Altmann & Trafton, 2002, p. 46).

Cues help reactivate goals and counter their decay in memory. But they need to be present in the environment before goals are suspended (Altmann & Trafton, 2002). They play a role during the interruption lag (recall the transition phases in figure 1). They allow for preparing for the resumption (Trafton, Altmann, Brock & Mintz, 2003; Altmann & Trafton, 2004; Clifford & Altmann, 2004; Hodgetts & Jones, 2006b). Otherwise, without external cues, activation of goals decays rapidly. Goals need to have a high level of activation to be recalled promptly, even for short interruptions (5 seconds) (Edwards, McDaniels, Williford, Pagan & Dismukes, 2003).

Memory loss is also sensitive to conflict of attention between primary tasks and secondary tasks. These conflicts interfere with activation of goals. Similarities between the two tasks are detrimental. Individuals have more difficulty resuming primary tasks when tasks overlap in terms of components (Gillie & Broadbent, 1989; Adamczyk & Bailey, 2004,

Edwards & Gronlund, 1998). These types of interference cancel out the advantage of short interruptions over long interruptions. For instance, in Gillie and Broadbent (1989), individuals completing complex arithmetic tasks during interruptions didn't resume any faster after 30-second interruptions than after 2-minute interruptions.

The resumption can also be affected by the timing of interruptions in the course of actions. Interruptions are less detrimental, or more tolerable, when actions are completed than when they are not. The completion of actions corresponds to natural breakpoints in the task structure (Miyata & Norman, 1986; Zacks & Tversky, 2001). These are when individuals change goals. Completed tasks go into the background and new tasks can be pushed into the foreground (Miyata & Norman, 1986). These points in the task are also called task boundaries (Adamczyk & Bailey, 2004; Bailey & Iqbal, 2008; Zacks & Tversky, 2001). Individuals are better at identifying task boundaries at task completion, than at mid-task (Adamczyk & Bailey, 2004; Zacks & Tversky, 2001). At task boundaries, there should be more prominent and fewer goals in memory, because most goals in the current task are completed. Reactivation of goals at these points is easier. In contrast, reactivation of uncompleted tasks requires more sub-goals to be reactivated (Altmann & Trafton, 2002).

Both field studies and experiments report decreased performances at resumption of uncompleted actions in comparison to resumptions of completed actions. Workers had more trouble switching tasks during tasks than between tasks (Czerwinski, Horvitz & Wilhite, 2004; Cutrell, Czerwinski, & Horvitz, 2001; Czerwinski, Cutrell, & Horvitz, 2000; Adamczyk & Bailey, 2004). Individuals remembered better what they did in the primary activity after completed actions than uncompleted actions, except when tasks were similar (Edwards & Gronlund, 1998). Also, participants resumed faster when they were interrupted at the beginning of new tasks (Monk, Boehm-Davis, & Trafton, 2002, 2004) or at task boundaries (Adamczyk & Bailey, 2004; Iqbal, Adamczyk, Zheng & Bailey, 2005; Iqbal & Bailey, 2006).

2.4 Interruptions in language productions

Cognitive costs of resuming activities have also been studied in psycholinguistics (e.g., Grosz & Sidner, 1986; Levelt, 1989). Individuals' activities are uttering speech, or producing discourse. When individuals resuming their discourse, they resume interrupted utterances to fulfill their intentions (Grosz & Sidner, 1986; Levelt, 1989; Swets, 2006). Grosz and Sidner (1986) present a theory on structures of dialogue that is similar to action

theories. Discourse is a task-oriented activity. It implies intentions (goals) of actions and attention. Goals and sub-goals refer respectively to discourse purpose and discourse segments purpose. Then, to achieve a discourse purpose, discourse segments purpose must be satisfied. Shifts of attention are possible between discourse segments, because the structure is emergent. In the case of interruption, a new discourse segment is unrelated to the purpose of the discourse, and it cannot fulfill the current goal. Individuals shift their attention on another topic. Later, individuals shift their attentions and goals back to previous discourse. Individuals reactivate the stack, discourse is resumed, and the focus returns to the interrupted discourse segment (Grosz & Sidner, 1986).

Similarly, Levelt (1989) described discourse as a representation of a goal plan with executed and remaining intentions. He called this representation “bookkeeping”. This structure of intentions allows individuals to keep track of what has been done and of what still needs to be done. It’s nothing less than a memory of an action plan. Levelt (1989) also considers discourse in a hierarchical perspective. He argues that individuals can move up and down in a conversational structure. Similarly to the task literature, it is implied that interruptions at lower-level (sub-goals) might be more disruptive (Zacks & Tversky, 2001). This was tested by Swets (2006). He found that interruptions were more disruptive at the beginning of sentence productions than near the end. Resumptions took longer because more syntax plans needed to be reactivated.

These studies of interruptions in discourse production represent a special case of task interruptions. They did not consider interruptions from an interactional perspective. In these accounts, when individuals are interrupted, they switch their attention onto other actions. And then, when they return to the suspended activity, they reactivate goals and resume their actions. But, as we will see in the next chapter, when people interact, they have to coordinate each other’s view of the current activity. Can they really merely resume their own suspended intentions to continue their interactions?

We will now present literature about language use in social interactions. This will give us the conceptual tools to study how people suspend joint activities.

Chapter 3 – Coordinating activities with language

As introduced earlier, people need to interact to coordinate their common activities. But so far, the theories we have seen distinguish actions and language as separate activities. We will see now that when people interact, their language is not free of context, nor are their actions free of language.

In the second half of the twentieth century, new theories emerged (e.g., Austin, 1962; Goffman, 1967, 1981, 1983; Sacks, Schegloff & Jefferson, 1973, 1974; Grice, 1975, Clark, 1996) that view human actions within context, as opposed to actions viewed outside of context (for instance studies of language following Chomsky or Saussure; Goodwin & Heritage, 1990). In this chapter, we review major scientific contributions that will be used as a conceptual framework to study interruptions in joint activities.

3.1 Joint activities

Joint actions happen in joint activities or social activities. Similarly to Goffman's (1981) notion of framework of situations, Clark (1996) proposes that joint activities have participants who have roles and goals (public and private), in which interactions take place, and where actions are bound in time and within context. Joint activities imply numerous aspects. First, people's actions are situated in a given context. They have a "here and now" quality. This means that people's actions are emerging in their environment and are a construct of the interactions between people and the environment at a given time (Goodwin & Heritage, 1990). Individuals' actions are autonomous, but they are also related to the joint actions taking place. So they need to be coordinated. Second, joint activities require use of language as a medium to coordinate individual actions. In particular, the face-to-face setting is considered as the most basic and best medium to coordinate people's actions (Goffman, 1981; Goodwin & Heritage, 1990; Clark 1996). The critical part of language use, of course, is that people understand each other. Third, joint activities require people's participation and agenda. When people interact, they also coordinate each other's face and roles (Goffman, 1967, 1981). So, joint activities require, at least, the coordination of people's actions and people's involvement. The two are interdependent. But for the purpose of clarity, we will first address the coordination of people's actions, and then later, the coordination of

people's involvement.

3.2. Speech act theories

Austin and Grice were pioneers in viewing language as social action (Holtgraves, 2001). For Austin (1962), each speech act has a propositional meaning (locutionary act), a conventional force of saying (illocutionary act), and an effect on the hearer (perlocutionary act). For Grice (1975), speakers are trying to do things with their words (illocutionary force). They have meanings in the sense of intentions (Clark, 1996). For Grice, intentions are only fulfilled when hearers recognize the speakers' intentions (illocutionary force). This defines communicative acts: When a person signals something and another person recognizes what is meant (Clark, 1996). Recognition is crucial, because utterances can have various effects besides what the speakers initially intended. In other words, perlocutionary and illocutionary force can be distinct, since perlocutionary effects depend on how hearers interpret those (Holtgraves, 2001). This is true for non-verbal acts as well, like extending a hand to shake hands. This joint action cannot be fulfilled if it is not recognized by the other participant.

For the purpose of recognizing each other's intentions, Grice argued that both interlocutors expect to follow a cooperative principle: "Make your conversational contribution such as required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged in." (Clark, 1996, p. 140). He suggested that conversational participants assume their partners follow four maxims, as part of the cooperative principle (Clark, 1996, p. 142):

- A maxim of quantity: Make your contribution as informative as required (for the current purpose of the exchange), not more or less informative than required.
- A maxim of quality: Do not say what you believe to be false, or what you lack evidence for.
- A maxim of relation: Be relevant.
- A maxim of manner: Be clear. Avoid ambiguity and obscurity. Be brief and orderly.

So to make sure people understand what someone is saying, they should utter as much as is needed, in a true, relevant and clear fashion. But, it turns out that people rarely follow these maxims. Rather, people assume that their partners do. People interpret utterances as if they were intended to be informative, true, relevant and clear. There are several reasons people deviate from these maxims, one of them is avoiding confrontation by using indirect speech (see, Clark, 1996; Brown & Levinson, 1987).

In the case of indirect speech, the intended force doesn't match the literal force, e.g., "It's getting cold in here". In this example, the speaker means more than just saying that it's getting cold. The implied meaning, or the intention, is to enlist some help in getting the speaker warmer, for example by closing a window. For Grice, implications are calculable. He proposed that people distinguish the literal and implicating forces and that they are thus able to determine the intended illocutionary act (Clark, 1996).

3.3 Turn-taking

In parallel to philosophers, like Austin and Grice, Goffman's interaction order (1983) and Garfinkel's ethnomethodological (1967) views led to the development of conversational analysis, by H. Sacks and his colleagues E. Schegloff and G. Jefferson (Goodwin & Heritage, 1990). Sacks, Schegloff and Jefferson (1974) proposed an account of analysis of conversation by describing how turns are organized in social activities. They developed a systematic description of how people negotiate each other's moves in social activities. These moves are turns participants take to organize their activities. Taking turns are systems that constrain activities. Turns have two fundamental properties. First, usually, only one person can talk at a time. Speakers change. Turns can vary in length, but they are allocated to one person at a given time. Second, turns are both context-free and context-sensitive. It means that turn-taking is an invariant form found in all conversations, but it can be adapted to all sorts of situations.

Turn-taking systems have two components: construction and allocation of turns. Constructions of turns are utterances and can take any semantic forms. The constructions allow interlocutors to project completion of turns, which allows for a transition relevance place. This place, or moment, is when a change of turn can first occur (e.g., at the end of a sentence). Then allocations of turns follow a series of rules. These rules are normative. They coordinate participants' next turn and, normally, prevent gap or overlap. Specifically, they also are techniques of selection a speaker can use to keep or leave the floor in a conversation. Turns can be constructed in such way that: 1) they select the other party to take the floor; 2) they leave the floor open for another speaker; 3) or they let the current speaker continue, unless another participant self-selects. These rules apply for each subsequent turns and can only apply at the first possible transition-relevance place. They are also ordered by constraint. Rule number 1 is constrained by rule number 2 and 3, and rule

number 2 is constrained by rule number 3. These rules have several important implications. Among them, only one person talks at the same time. People's utterances can overlap, but briefly. People use techniques to change turns by the way they utter their contributions. People are able to project end of turns and change turns. This leads to a first property of the turn-taking system: turns happen sequentially (Sacks, Schegloff & Jefferson, 1974). Because each participant performs autonomous joint actions, they need to sequence them in order to figure out each other's intentions.

The second property is that turns form adjacency pairs (Schegloff & Sacks, 1973). Adjacency pairs are defined like this: When an action is produced (a first pair part), it requires a reciprocal action (the second pair part). Of course, these actions are turns. They can even be single-word utterances like acknowledgment tokens (Goodwin & Heritage, 1990). For Clark (1996), these actions don't need to be verbal. They can also be moves, nods, gestures. Adjacency pairs rely on the principle of conditional relevance. A given turn constrains a subsequent turn, and that next turn is constrained by a prior turn. A participant's first part constrains, or implicates, what the other participant can say. If the first participant used a technique that left the floor to the other participant, the latter will be expected to take the floor and to utter something in return that is relevant for the previous turn. If it doesn't happen its absence will be noticed. The order of the pair parts depends on understanding of the first pair parts. The occurrence of a second pair parts depends on the recognition of the completion of the first parts. But the occurrence of a second part also depends on what is expected from the first part. So typically, because of conditional relevance, second pair parts indicate understanding and acceptance of first pair parts. Second pair parts give sense to the first pair parts (Schegloff & Sacks, 1973). Adjacency pairs hold participants accountable to produce coherent courses of action (Goodwin & Heritage, 1990). They solve problems of construing intentions, and at the same time, they accomplish joint actions (Clark, 1996).

Prototypical examples of adjacency pairs are greetings and closing of exchanges (Schegloff & Sacks, 1973, Clark, 1996). When a person greets another person, most often, the other person will greet back. Other typical examples are questions and answers, or complaints and apologies. In the case of closings, adjacency pairs fulfill common intentions of closing an exchange at a given moment.

3.4 Joint projects

According to Clark (1996), speakers and hearers understand each other by coordinating joint projects. In joint projects, speakers propose a joint action, and addressees² take it up. Clark gives the simple example of a speaker inviting an addressee to sit down on a chair, and the addressee agreeing to sit on the chair. Each joint project can be decomposed into an action ladder, both for speakers' (S) and addressees' (A) actions (Clark, 1996, p. 152):

- Level 1: S executes behavior (utters words "sit down") for A
 - A attends to behavior (listens to produced words "sit down") from S
- Level 2: S presents signal "sit down" (locutionary act of saying it) to A
 - A identifies signal "sit down" from Speakers
- Level 3: S signals that he is asking to sit down (illocutionary act of meaning) for A
 - A recognizes that S asked to sit down (understands)
- Level 4: S proposes joint project to get to sit down (perlocutionary act) to A
 - A considers S's proposal to sit down

Speakers must succeed in accomplishing all 4 levels of action, and addressees must identify all 4 levels of speakers' action, in order that addressees take up speakers' proposals, and that speakers' proposal is construed as intended. This depends on the understanding of the intended meaning, but also how each participant takes up proposals.

In joint projects, participants can share a joint purpose (Clark, 1996). For that, the following requirements are needed. Participants must first identify a common purpose. They must be able and willing to do what they are supposed to do for that purpose. And they must believe that the purpose, the ability and the willingness are shared between participants. But all of these requirements are not given. They are established or negotiated throughout the joint project, step-by-step. People are also free to take up or decline proposals. So, joint projects extend and unfold in a local and in an opportune way, one adjacency pairs after another.

The progress of joint projects depends on how addressees construe proposals (Clark, 1996). The way they react reflects their construal of speakers' proposals. But it's their uptake that defines the proposition, not the opposite (Clark, 1996). Construal is critical for

² We opt now for the term "addressees" over "hearers", because addressees are the persons utterances are designed for, where as hearers are any persons listening to utterances. The first term encompasses better the cooperative roles of the participants.

people to understand each other. Clark proposes the notion of joint construal. Joint construal is the attempt from both the speaker and the addressee to construe what the speaker is taken to be meant. For instance, a same offer (sit down on a chair) can be followed by several responses, which show the offer was construed differently (e.g., as an order or as a advise). Then speakers can accept or correct the proposed construal to ensure that their earlier proposal was construed as it was meant to be (if they wish so). Displays of construal are crucial, because they give the participants the opportunity to validate or correct proposals, or joint actions (Clark, 1996). This is part of the grounding process.

3.5 Grounding

Grounding is the process of establishing common ground (Clark & Schaefer, 1989; Clark, 1996). To coordinate their joint projects, people need a coordination device so they believe they are achieving joint goals. Clark (1996) proposes that participants share common ground as a coordination device. Two people have common ground about a fact, if (Clark, 1996, p. 97):

- 1 Both participants believe (or have information) that some situation holds;
- 2 That situation indicates to both that both believe (or have the information) that the situation holds;
- 3 That situation indicates to both that the fact exists.

People try to ground what they do, at least well enough for current purposes (Clark, 1996). People need evidence of intended actions. Clark (1996) referred to Norman's notion of closure (1988), defined as "agents performing an action require evidence, sufficient for the current purposes, that they have succeeded in performing it." (p. 222). They need evidence of closure. For that, evidence must be valid, as easy to get as possible, timely and sufficient for the current purpose. So Clark proposes that participants minimize their effort and follow the principle of least collaborative effort. When participants perform joint actions, then the principle of joint closure applies: "The participants in a joint action try to establish the mutual belief that they have succeeded well enough for current purposes." (p. 226). Both participants need to share evidence so they can believe they are succeeding.

To reach common ground, people make contributions. A contribution consists of a presentation and an acceptance phase. In the first phase, a person A presents an utterance (an action), and in the second phase a person B provides evidence until both of them accept

that B has understood well enough for the current propose. When the two phases are complete, both share the mutual belief that B understood what A meant. Only then has A completed his or her contribution. It's similar to joint construal. A proposes (or presents) a joint project, that B construes (or accepts). But the additional step is that B's construal is registered by A, so that B knows that A knows B understands.

The grounding process is important because initially presented utterances are not always clear and sufficient for the current purpose. When participants have the floor, they are expected to use it. There is a time pressure to deliver. So, for instance, utterances can be disrupted or disfluent. If speakers don't provide enough evidence in the presentation phase, then participants can engage in repairs to adjust mutual understanding in the acceptance phase. People can provide positive and negative evidence of understanding in the acceptance phase (Clark & Brennan, 1991; Clark, 1996). For example, people not only acknowledge or take up with a relevant next turn, but they can also give continuous attention (e.g., eye gaze, facial expressions) or perform actions (e.g., sitting on a chair after being invited to), as evidence of understanding.

Media constraints can affect the grounding process (Clark & Brennan, 1991). Clark & Brennan listed eight properties of different media (p. 141):

1. Copresence: Participant A and participant B share the same physical environment;
2. Visibility: A and B are visible to each other;
3. Audibility: A and B communicate by speaking and can hear each other;
4. Cotemporality: B receives at the same time as A produces (e.g., B hears an utterance A is producing);
5. Simultaneity: A and B can send and receive at once and simultaneously (e.g., B smiles while A utters something);
6. Sequentiality: A's and B's turns cannot get out of sequence (interaction turn by turn);
7. Reviewability: B can review A's messages (e.g., when artifacts like letters are produced as opposed to evanescence of speech);
8. Revisability: A can revise messages for B (can be done privately before it is addressed).

The costs of mutual understanding thus depend on the medium of communication participants use (Clark & Brennan, 1991). The combination of these constraints has various effects on the cost of grounding. These constraints mostly affect evidence and timing for adjusting understanding. We will consider face-to-face and phone interactions. Face-to-face

interactions combine the first six constraints. It is the best medium when participants can have trouble understanding each other. Participants can see each other and rely on visible evidence (e.g., nods, gaze, gestures, and facial expressions). They can repair misunderstanding right away. In phone conversations, participants can't see each other; they miss clues about each other's actions and non-verbal evidence. They are also not co-present. They are unaware of factors in each other's physical environment that can interfere with the grounding process, for instance, distractions, disruptions and interruptions (Clark, 1996).

3.6 Context and participants' roles

Participants can have different roles and have different goals (private and public intentions) in a given context of interactions. With participants' roles and intentions come the notions of equity, face and commitment to joint projects.

Participants' role in context is defined in Goffman's participation framework (1981). Participants are members of social gatherings where they share a space to interact. Participants engage or not in interactions (floor-taking), and their participation can be ratified or not. Footing refers to the way participants stand in the gathering (Goffman also uses terms like "posture" or "project"). Footing changes, as participants exchange utterances. Participants can adopt roles of speakers, hearers or even overhearers. These roles have different statuses based on their ratifications. Hearers can be primary addressees, when speakers address utterances to them. In this case, they are ratified hearers. Hearers can also be overhearers, when speakers didn't address utterances to them, but they nonetheless overheard them. In this case, they are non-ratified hearers. Overhearers can be by-standers or eavesdroppers. By-standers' presences are known and they are expected to overhear utterances, whereas it is not the case for eavesdroppers. For instance, ratified hearers can become by-standers when two other participants are involved in a side conversation. At the same time, non-ratified hearers can initiate conversations, even though they were not addressees (e.g., intrusions).

3.7 Facework

In social situations, people try to maximize outcomes to their advantage. There are costs and benefits involved in social interactions. These interactions are regulated by

systems (justice, markets). When people are in inequitable situations, they are motivated to restore equity. Though, there are situations where equity might depend on a participant's willingness to maintain it. There are situations where people are in debt to others who expect a compensation for their costs (Clark, 1996).

Equity is best understood with the notion of face (Goffman, 1967). In social interactions, or encounters, participants act out a "line", or stance. A line is "a pattern of verbal and non-verbal acts by which [a participant] expresses his view of the situation and through this his evaluation of the participants, especially himself." (Goffman, 1967, p. 213). It shows how participants stand in a situation. Face is "defined as the positive social value a person effectively claims for himself by the line others assume he has taken during a particular contact." (Goffman, 1967, p. 213). Maintaining face is based on expectations by society. It is loaned to people by society. For instance, people can receive honors or be praised, but they also can lose face, and feel embarrassed or humiliated (see also Brown & Levinson, 1987). Face loss happens when expectations by society are not met. People can be out of face or in a wrong face. Therefore, they can try to save their face, especially when face is threatened. The most common rules to keep face are the use of tact, savoir-faire, or etiquette. Goffman (1967) proposed that people engage in trying to defend their own face and to protect other's face. He called this process face work (here after "facework"). Facework presupposes reciprocity of faces in cooperation. When someone loses face, compensations should occur. Lack of effort can be minimal and be noticed by any party. When people interact, face is constantly attended to and regulated. They share a mutual concern with face. For Brown and Levinson (1987), people not only constantly maintain, but enhance, each other's face to avoid face loss.

Drawing from Goffman's seminal work (1967), Brown and Levinson (1987) further developed the notion of facework and strategies people can use during interactions. They described two types of face wants (needs): Positive face & negative face. Positive face refers to the desire to be appreciated as a person. Negative face refers to the desire to see someone's actions not impeded by others. It relates to the need to remain autonomous and free to act. People, communities, societies have developed strategies for these face wants, and in particular to deal with threats to negative face, when acts are inevitable or desired. These threats are called face-threatening acts (FTA). There can be positive or negative face-threatening acts. Positive face-threatening acts can be any acts that are insensitive to about

someone's feelings or needs for esteem. These can be negative appreciations or indifference about someone (e.g., for hearers³: insults, disagreements, belittling, talking about a sensitive topic, showing excessive intimacy). Negative face-threatening acts can be any acts that obstruct a person's freedom of action. It often implies an imposition of some sort on the other person (e.g., for hearers, orders, requests, anger, also offers than someone doesn't want; but also for speakers, being forced to thank, to give apologies, or to accept someone's offer). To avoid threatening face, people can use face-redressive actions. The amount of facework depends on the assessment of the situation. There are three factors that determine the gravity of a face-threatening act: the power difference between the two parties, the social distance between the two parties, and the gravity of the imposition itself (social value of the threat), regardless of the parties (a request to borrow money involves more face threat than a request to borrow a tool). These factors add up, and their combination determines the risk of face-threat. There are five types of strategies to save face (Figure 3).

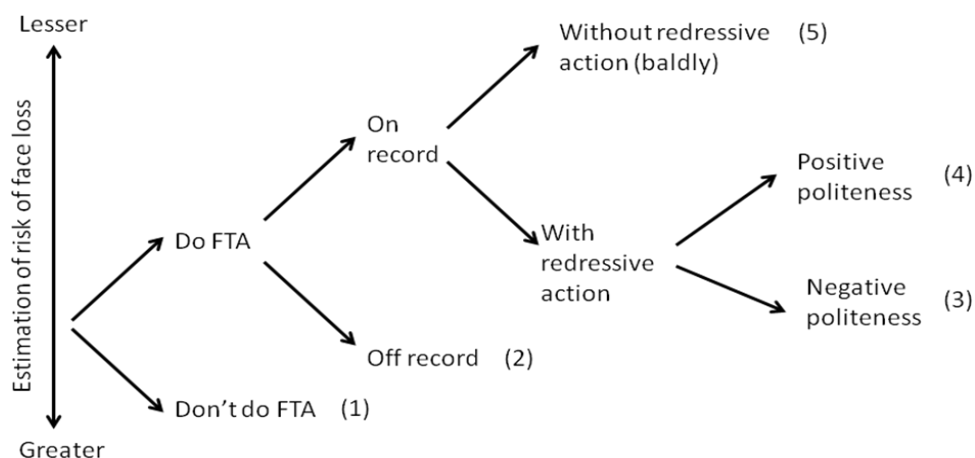


Figure 3. Strategies with Face-Threatening Acts (FTA), adapted from Brown and Levinson (1987, p. 60).

The first strategy is to not perform the Face-Threatening Act (1), because the risk of face loss is too important. The second strategy (2) is to act “off record”, in other words indirectly. It allows the hearer to not follow up, since the act is not officially directed to the hearer and not formulated as a request. For instance, a person can say “it’s getting cold in here” and imply it would be desirable if it was warmer. If the hearer is the owner of the place, and if he picks up on it, he can decide to turn up the thermostat. But the speaker

³ We use the same term Brown and Levinson used.

didn't confront the owner. So no face is threatened if the owner doesn't comply. The third strategy (3) is to go on record and reduce, or possibly avoid, the imposition on the hearer's face (avoidance-based, negative politeness). There is a risk of embarrassment since FTA is addressed directly. A typical case is asking a favor. There are several ways to redress threat, for instance: apologize, use impersonal pronouns, indirect speech, explicitly minimize impinging (showing reluctance, asking for forgiveness), explicitly lessen coercion (e.g., use of subjunctive tense, questions), avoid presumption of compliance (adding conditional, e.g., "if you can"), hedging (words mitigating impact: might, perhaps, etc.). The fourth strategy (4) is to go on record and value the hearer's self or interests, face wants (approach-based, positive politeness). That strategy can be used when people know each other. In the case of a favor, a speaker can, for instance, make a statement about the friendship (my friend), compliments (you look great), attend or address the hearer's interest (help), share perspective or be inclusive (agreement, use of "we"), offer something in exchange, or make a joke. Finally, the fifth strategy (5) is to act baldly, without any redressive actions. This is usually done when hearers and speakers know each other well. These acts would normally embarrass other acquaintances. It can be in the interest of the hearer (your tie has a stain), or regarding other activities (pass me the salt), with little or no need to maintain face. Or it could be by minimizing threats implicitly (e.g., welcomes, offers). These strategies allow people to perform sensitive actions with respect to others' feelings.

Every joint project involves equity and facework (Clark, 1996, 2006). Participants commit themselves to given joint projects. They commit themselves publicly to other participants who do their part for joint projects. When committing to a joint project, people expect that equity will be maintained (Clark, 1996). Joint commitment is the driving force behind joint activities (Clark, 2006). Participants commit for each of their joint projects. In each of these activities, series of joint actions emerge sequentially and hierarchically (Bangerter & Clark, 2003). Each joint action is a sub-problem that needs to be solved piecemeal in order to move on in the projects. Some are dependent of completion of other joint actions. Joint actions can be decomposed in hierarchical analysis. This means that each participant commits themselves to a hierarchy of joint projects, until the overall purpose of the joint activity is reached. This means that joint commitments have several constraining properties for participants. Hand-in-hand with joint actions, joint commitments stack up and persist. Until joint actions are completed, both participants are committed to achieving

them. As a consequence, joint commitments make joint activities hard to part from or stop without threatening people's face (Clark, 2006). Closings of encounters are good examples of how face and equity is preserved (Schegloff & Sacks, 1973).

Chapter 4 – Research questions

So far, we have seen implications of interruptions in organizations and for individuals, and on how people use language in interactions. Since the beginning, I have presented the phenomenon of interruptions as a problem of coordination. At a macro level, the problem comes from overlapping interdependencies. People are facing conflicting interactions, they have to switch activities unexpectedly, and they lose time and productivity. At a micro level, the problem is described as conflicts of attentions and intentions between two activities, with potential loss of memory and efficiency. People have to suspend what they are doing, and later on they have to remember suspended goals. But so far, no study has described the interruption processes from a collaborative point of view. So, if we want to know how participants deal with interruptions, we need to have a closer look how people disengage from and reengage in joint activities.

4.1 Suspensions

When participants use language for joint activities, they coordinate essentially on two processes: mutual actions and mutual face (facework). Based on this, we can make a first assumption. Suspending interactions must involve the same processes as in contributing to interactions.

Now, I propose to delineate a framework for studying suspensions. To do that, we will now take a closer look at our first example of suspension, with Marc and Lydia, and describe the relevant collaborative parameters that are involved.

Marc and Lydia are sitting at a table in Marc's office. Lydia is a client who is interested in buying a car, and Marc is trying to sell it to her. They have settled on the car, and are negotiating the options and the price of the car. He has just mentioned the option of a navigation system, when all of a sudden, the phone rings. Marc notices the incoming call is from an important client. He needs to pick up the phone. Lydia, who sees Marc looking at the phone, stops talking. He then asks her if she wouldn't mind he picked up the phone. She nods and he picks up the phone. Marc greets the other client and asks if he can call back later. In the meantime, Lydia checks her agenda. After a minute or so, Marc hangs up and apologizes for the inconvenience. Lydia assures no offense was made. He then resumes talking about the option they were negotiating. He reiterates the advantage of having a

navigation system and proposes a price. She asks for clarifications about the navigation system and they continue talking about how much it would cost.

What are the processes involved in this joint activity? As we have seen in Clark (1996) and in Goffman (1981), interactive situations include participants and joint actions. Participants have faces, roles and goals (public and private). They perform joint actions in a joint project to which they both commit. Joint actions are situated here and now. So, let's now look at coordination processes, consider similar phenomena, and draw some assumptions. First, we will look at coordination of face. Second, we will look at coordination of joint projects. Third, we will look at relative parameters, like participants' role, timing of interruptions, and media of communication.

First, joint activities involve the coordination of face (Clark, 1996, 2006; Brown & Levinson, 1987; Schegloff & Sacks, 1973; Goffman, 1967). Participants mutually commit to a joint project. By doing so, they give up part of their freedom and they thus expect equitable treatment from their partners. In the example, Marc and Lydia are strangers to each other. Marc is trying to sell a car in exchange for Lydia's money. When Marc receives the phone call, he needs to disengage from their joint project. We can assume that suspension can threaten Lydia's face. For instance, here, Marc is forced to make Lydia wait, thus taking advantage of her availability and commitment. However, Marc doesn't interrupt their discussion and pick up the phone straight away. Instead, he politely asks her permission to pick up the phone, and when he is done, he apologizes. The amount of politeness is an indicator how much face threat is perceived. In this case, Marc engaged in polite acts by extensively redressing Lydia's negative face.

Similar phenomena are found in closing phone conversations (Schegloff & Sacks, 1973; Clark, 1996). Participants take leave of each other only after they have closed down their topic of discussion and when they both are ready to disengage. This often involves a series of adjacency pairs to first close the topic and then to close their interaction (Schegloff & Sacks, 1973). At closings, people aim at disengaging at the same time to avoid offending their partners (Clark & French, 1981; Clark, 1996). For instance, closings may include justifications and desire for continuity (Albert & Kessler, 1976). Sequences in suspensions might be similar to those found in closing, except that people take leave of each other only momentarily.

Second, joint activities involve the negotiation of joint sub-projects (Clark 1996, 2006;

Bangerter & Clark, 2003). Participants enter and commit to a series of joint projects. In each of the project and sub-projects, participants ground their joint actions, sequentially and hierarchically. They take turns in contributing, and so their project emerges step-by-step. Each contribution is relevant to where they are in their task. Also as they further move along in sub-projects, commitments stack up and persist until they are discharged by the pair. In a task-oriented joint activity, suspended goals should remain active until they are accomplished. In the example, Marc and Lydia are well engrossed in their project. They have already agreed on the car, and they are negotiating options of that car. He mentioned a navigation system option, when the phone rings. It looks like Lydia wasn't able to take up his proposal. It's left out, because they agree to suspend their conversation. When they return to it, Marc re-iterates his previous proposal. He repeats some advantages of having the option and gives an offer. But Lydia doesn't agree with his proposal. She doesn't understand and asks for clarifications about the option. So, this could indicate Marc and Lydia have to adjust what is in common ground, before they can continue. Marc chose to repeat earlier utterances (about the option) and propose a new joint action (price), but Lydia hadn't responded to Marc's earlier proposal, so it caused them some problems to continue without grounding it.

Similar phenomena appear in cases of repairs of utterances. People tend to repeat their utterances when facing problems (Levelt, 1989), and tend to prefer self-correction over corrections initiated by others (Clark, 1994; Clark & Wasow, 1998; Schegloff, Jefferson & Sacks, 1977). So with this example, we can assume that people need to share common ground to progress in a joint project (Clark, 1996). And to do so, pairs might need to reconstruct common ground after suspensions.

Third, joint activities involve situational parameters, such as roles of participants, timing of actions, and communication media. These may influence the process of facework and grounding. Interruptions are often unforeseen. They can disrupt the participants when they have different roles. Participants who have to suspend can be speakers or addressees. We could assume it is more face-threatening for participants when they have the floor than when they don't. In the example, Marc has the floor when he is interrupted by the phone call. So, he is in a position to initiate the suspension. But Lydia could have received a call. How would she have initiated the suspension? Also, interruptions can happen at any given moment in a course of action. Similarly to the goal activation model's predictions (Altman &

Trafton, 2002), stacks of goals are easier to reinstate at task boundaries. We could assume it is harder to reinstate when participants have to suspend in the middle of joint projects than at the end. Finally, communication medium influences the amount of evidence pairs are relying on to ground their joint actions (Clark & Brennan, 1991; Clark & Krych, 2004). In the example, Marc and Lydia are face-to-face. They benefit from copresence, visibility, audibility, and simultaneity constraints. Because she is copresent, Lydia hears the phone ringing, and sees Marc turning his attention onto it. This tips her off about what relevant action could be next. She can anticipate his actions and show evidence that she understands he needs to answer the phone. This diminishes face threat. They might also share a brochure about the car's options. So this could provide clues about where they are in the task. This could help Lydia remember about their suspended goals. So when they return to their discussion, they may recall where on the brochure their joint attention was. So we could assume that copresence and visibility can influence face threat and recollection of the state of the tasks.

4.2 Research goals

The main goal of this project is to describe the process of suspending and reinstating, both at the face and the action levels. The suspension and reinstatement are different steps, and the latter should be dependent on the former. Both face and action levels are interlaced in coordinating joint projects, but they may be dealt with differently.

How do people avoid face loss? If disengaging from an interaction is face-threatening (Clark, 2006), participants may use politeness to redress the situation. How do people do that? Face-work might change with different footing of the situation, for instance, when participants have different conversational roles. Also facework might be directly influenced by the imposition of interruption itself.

How do people reinstate their joint actions? If people rely on common ground to continue tasks (Clark, 1996), then they might need to make sure they both know where they are in their project. How do people do that? This may depend on the state of the course of actions and evidence about common ground (Clark & Brennan, 1991). But it could also be influenced by the duration of interruptions, because goals decay in people's memory (Altmann & Trafton, 2002).

We addressed these questions in a series of five studies. We looked at facework and grounding processes in the first three studies and we looked exclusively at grounding

processes in the last two studies.

4.3 Research plan: 5 studies.

The 5 studies were planned in the following manner.

Study 1: We developed a model of suspension of collaborative activities. We analyzed transcriptions of naturally occurring interruptions in a corpus of phone calls. We derived factors such as duration of interruptions and conversational role as the main influence on collaborative costs in the suspensions. We coded variables related to facework and collaborative efforts to reinstate topics of conversations. We coded all cases in the corpus and analyzed data. Results showed significant effects of duration and conversational roles on facework and on topical reinstatement. Longer suspensions increased facework and the effort to reinstate the conversation. Also, addressees were more polite than speakers.

Study 2: We planned to test effects found in Study 1. In an experimental setting, we manipulated the duration of interruptions (Long vs. short) and conversational roles (Speaker vs. addressee) during phone calls. We used a cover story to interrupt of the participants. We hypothesized same effects found in Study 1.

Study 3: We replicated results of Study 2 in a similar setting. But we manipulated conversational roles differently, because the manipulation in Study 1 wasn't reliable. We asked participants to narrate stories, instead of discussing topics freely. We hypothesized same effects found in Studies 1 & 2.

Study 4: We focused on reinstatement of joint actions in task-oriented dialogues. In an experimental setting, we manipulated the duration (Long vs. short) and the timing (Mid-task vs. end-task) of interruptions in the tasks. We also manipulated which participants were distracted during interruptions (Target: Instructor, partners, or both). We hypothesized that long interruptions, mid-task interruptions, and both targets distracted would increase the effort to reinstate common ground.

Study 5: We used the same experimental design and changed 2 parameters: the duration of interruptions (both short vs. long were longer) and the medium of communication (Workspace visible vs. hidden). We hypothesized again for the same effects of the manipulation of the duration and the timing of interruptions on the effort to reinstate common ground (Study 4). And additionally, we hypothesized that workspace visibility would reduce the effort at reinstatement.

These five studies are reported in three manuscripts. Studies 1 and 2 are reported in the first manuscript (Chapter 5). Study 3 is in the following manuscript (Chapter 6). Studies 4 and 5 are in the last manuscript (Chapter 7). The first two manuscripts have been accepted for publication, respectively in *Discourse Processes* (Chevalley & Bangerter, in press), and in the *Journal of Language and Social Psychology* (Bangerter, Chevalley & Derouwaux, in press). The last manuscript is a working paper (Chevalley & Bangerter, in prep.).

Chapter 5 – Suspending and reinstating joint activities with dialogue (Studies 1 and 2)

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5.1 Abstract

Interruptions are common in joint activities like conversations. Typically, interrupted participants suspend the activity, address the interruption, and then reinstate the activity. In conversation, people jointly commit to interact and to talk about a topic, establishing these commitments sequentially. When a commitment is suspended, face is threatened and grounding disrupted. We propose and test a model for suspending and reinstating joint activities, using evidence from naturally-occurring suspensions in the Switchboard corpus (Study 1) and from a laboratory experiment (Study 2). Results showed that long suspensions led to more politeness and more collaborative effort in reinstatement than short suspensions. Also, listeners were more polite than speakers in suspending. Overall, suspending and reinstating a joint activity was shown to be a collaborative task that requires coordination of both the topic and the participants' face requirements.

5.2 Introduction

Imagine that Bob and Camilla are talking on the phone about their work. Bob is telling Camilla a story when Diane enters Camilla's office to ask her a question. After waiting for an opportune moment, Camilla interrupts Bob to ask him to hold on, then answers Diane's question. She then apologizes to Bob for interrupting him and invites him to continue. In this example, Bob and Camilla have been interrupted in a collaborative task. Such interruptions are commonplace in everyday life. How can they be described, what processes do they involve, what factors influence them, and how do they affect collaboration? In this article, we present and test a model of interruptions of collaborative tasks, or, more generally, how people coordinate suspending and reinstating joint activities.

Cognitive science researchers have studied parallel activities (Miyata & Norman,

1986) and task interruptions (e.g., McFarlane & Latorella, 2002; Trafton, Altmann, Brock, & Mintz, 2003), but with a focus on individuals being interrupted while performing solitary tasks. Hardly any work has been done on interruptions affecting individuals in collaborative activities (but see Swets, 2006, who used confederates to study the effects of different kinds of partner interruptions on resumption of speech production). Moreover, collaborative interruptions cannot be explained by current generic models of interruptions (e.g., McFarlane & Latorella, 2002) because these models lack sufficient granularity to capture the specific features of collaborative activities. Prominent theories of discourse structure have been applied to interruptions (e.g., Grosz & Sidner, 1986), but they suffer from similar problems. Collaborative activities are special in that they involve commitments to interact with another person at multiple levels. Suspending activities requires participants to suspend those commitments. Suspensions and reinstatements reveal the nature of collaboration particularly well. Thus, our results have theoretical implications for understanding dialogue coordination, but also practical implications (e.g., design implications for collaborative interruptions management in human-computer interaction (HCI) (McFarlane & Latorella, 2002).

In what follows, we discuss how collaborative activity is coordinated, focusing on the joint commitments people make during interaction (Clark, 1996; 2006). We then present an account of suspending and reinstating interactions, which we subsequently explore in two empirical studies.

5.3 Joint projects and joint commitments

Dialogue is a species of collaborative activity (Clark, 1996). It is sequentially organized because utterances are contingent on preceding contributions to the dialogue (Sacks, Schegloff, & Jefferson, 1974). It is also hierarchically organized because, like all forms of activity, it is constituted of nested topics and subtopics (Grosz & Sidner, 1986) connected by links of coherence (Reichman, 1978).

People use dialogue to coordinate collaborative activities. They accomplish these activities by dividing them into parts and subparts, or joint projects and subprojects (Bangerter & Clark, 2003; Bangerter, Clark, & Katz, 2004). Imagine that Bob asks Camilla to help her move a heavy bench. This simple joint project can be divided into at least three subprojects: (1) picking up the bench, (2) moving it, and (3) putting it down. If Camilla agrees

to help, they first have to coordinate picking it up. This entails deciding who will pick up the left end and who will pick up the right end. It also entails exerting effort to lift it at exactly the same time. Thus, the subproject of picking up the bench can itself be divided into subprojects. Bob and Camilla coordinate the action of moving the bench through dialogue, and they typically do so piecemeal, by first agreeing to accomplish the joint project, then to enter the first subproject, and so on.

Participants in a joint project cannot automatically know that their partners will do their part. Bob cannot know that Camilla will heft her end of the heavy bench at exactly the same time he does, and the same goes for Camilla. So they need to agree on the details of their performance of each joint project and subproject. In other words, they need to *jointly commit* to performing a particular project (Clark, 2006). Joint commitments typically specify elements such as the participants' roles in a joint project, the actions they are to perform, when they are to do them and where.

There are at least three properties of joint commitments that are essential for understanding suspension and reinstatement of joint projects. First, joint commitments *bind resources* of participants. When committing themselves to a joint project, participants agree to use their resources (e.g., time, effort, money) to further those projects. They agree to temporarily give up part of their freedom and to allow their actions to depend on those of others (Goffman, 1967). In agreeing to help Bob, Camilla agrees to commit her time, but also to expend physical effort in lifting a heavy object. She also agrees to suspend other projects she may have been engaged in. Bob incurs a debt towards her that must be repaid. Lifting a bench is a trivial service that can be repaid symbolically with a modicum of politeness (Brown & Levinson, 1987), but other debts may require more compensation. Second, joint commitments accumulate, or *stack up*, in the course of a joint project (Clark, 2006; Grosz & Sidner, 1986). Once Camilla has agreed to help Bob lift the bench, she may agree to pick up the left end. In doing so, she may notice that her end is cracked and likely to break. In picking it up, she commits herself to apply extra care. Joint commitments at the top of a stack must be discharged in order to honor commitments lower down. In Figure 4, we can see three stacked joint commitments that Bob and Camilla might make. Third, commitments made at a lower level in a stack (i.e., made earlier) *persist* even if higher-level commitments are renegotiated, suspended, or aborted. Even if Camilla is not ready to pick up the left end of the bench when Bob is, she still remains committed to doing so until further notice. And

5.4.1 Similar phenomena

Suspending and reinstating joint projects is similar to the process of suspending and restarting speaking (self-suspension). This process can be decomposed into four steps (Clark & Wasow, 1998): (1) an initial commitment to uttering a constituent, (2) a suspension of speech, (3) a hiatus in speaking (sometimes marked with fillers like *uh* or *um*), and (4) a restart of the constituent. Self-suspensions arise in part because speakers make premature commitments to uttering a constituent and then have to stop to plan what they want to say. They make premature commitments because of the temporal imperative in conversation that requires them to not remain silent for too long while they have the floor (Jefferson, 1989). Suspensions of joint projects should follow a similar sequence as self-suspensions.

Suspending a joint project is also similar to the process of ending a social encounter (Albert & Kessler, 1976). Conversational endings are face-threatening events (Goffman, 1955). They must therefore be negotiated between participants (Schegloff & Sacks, 1973). Typical phenomena around endings include justifications, summaries of the encounter, continuity statements and well-wishing (Albert & Kessler, 1978; Clark & French, 1981). Justifications construct a socially acceptable reason to explain why an encounter must end (usually an external event impinging on the encounter, e.g., *I really must go*). Summaries of an encounter are selective repetitions of aspects of it that serve to better evaluate and remember it. Continuity statements symbolically bridge the upcoming separation by projecting future encounters between the participants (e.g., *I'll see you next week*).

More generally, encounters can be divided into three phases: the entry phase, the body, and the exit phase (Clark, 1996). The entry phase arises from the need to negotiate the terms of an encounter, including defining relevant social identities and agreeing to preliminary commitments. The body arises from the participants' discussion of the main business of the interaction. It is what the interaction is "about". The exit phase (or ending) arises from the need to coordinate getting out of the encounter (Schegloff & Sacks, 1973), including when to do so, whether and when there will be a future encounter, and so on. We suggest that suspending a conversation is analogous to exiting it, with the main difference being that one keeps a partner waiting rather than releasing him or her.

5.4.2 Steps in suspending and reinstating joint projects

In accordance with the above phenomena and building on previous generic models

(McFarlane & Latorella, 2002), our model of suspending and reinstating joint projects posits three steps: (1) suspending the joint project, (2) dealing with the interruption, and (3) reinstating the joint project. All three steps may entail sub-steps that arise from participants' efforts to coordinate constraints related to the stacking, persistence, and resource binding involved with joint commitments. To illustrate this process, we present the following excerpt of a naturally-occurring suspension of a telephone conversation taken from the Switchboard corpus (Godfrey, Holliman, & McDaniel, 1992) and describe each step as it occurs in the excerpt (for transcription conventions, see Study 1, Method).

Excerpt 1: SW 4660

- 19_Ann Uh, I do have my radio going most of the day though, so about every hour it breaks in and gives me news too, you know.
- 20_Ben Okay. #Do you# --
- 21_Ann #But,#
- 22_Ben -- get wh-, like one of the talk stations, the news stations?
- 23_Ann No. Uh-huh. Jus-, I just have a channel that has music except for, like every hour, you know, say eight o'clock, #nine# --
- 24_Ben #Sure.#
- 25_Ann -- o'clock, they come on for just a little bit of the news.
- 26_Ben Right.
- 27_Ann But as far as the actual news, I get that from [*call waiting signal*] from the, can you hold on just for a second?
- 28_Ben Sure.
- 29_Ann Just a minute. [*Pause: 2 min 9 sec*] [*to Ben*] Hello sir.
- 30_Ben Yes.
- 31_Ann Yes, I'm sorry to keep you waiting #[*laughter*].#
- 32_Ben #Okay# [*laughter*]
- 33_Ann Uh, I was calling from work so and that was a call waiting.
- 34_Ben Right. So, it sounds like you, uh, like the news a lot more than I do. Me, I figure if it's something really important, somebody will tell me about it.
[*continues*]

When disengaging from a joint project, the first step is negotiating the suspension. Since the beginning of the conversation, Ann and Ben have been talking about how they get

the news. Between turns 19 and 27, Ann explains how she gets short news every hour on a radio music channel. In turn 27, she starts to explain where she gets *actual* news when a call waiting⁴ signal sounds on her telephone.⁵ She interrupts herself to ask Ben to *hold on for just a second*. Ben agrees (turn 28), and Ann disengages by uttering *just a minute*. The sequence in turns 27 to 29 accomplishes the suspension. This allows Ann to part and deal with the interruption, the second step. During a few minutes, she talks with a third person.

In the third step, reinstating the joint project, availability needs to be checked and face needs addressed before Ann and Ben can continue with topical talk. These two sub-steps are accomplished in sequence. Ann checks Ben's availability by uttering *Hello sir* (turn 29) and Ben signals his presence, (*yes*, turn 30). Next, she apologizes (*I'm sorry to keep you waiting*, turn 31) and Ben expresses acceptance (*okay*, turn 32). Then she provides a justification by uttering *I was calling from work so and that was a call waiting* (turn 33) which he again accepts (turn 34). These two sub-steps (turn 29 to 33) are jointly done by adjacency pairs (Schegloff & Sacks, 1973). They precede the continuation of the joint project, which is initiated by Ben (*So, it sounds like you*, turn 34).

5.4.3 How the model explains the observed sequence

What are Ann and Ben accomplishing with these three steps? We propose that their actions result from the three properties of joint commitments discussed earlier: stacking, persistence and bound resources. As Ann and Ben's conversation proceeded, they stacked up layers of joint commitments. To show how they did so, it is necessary to analyze their conversation from the beginning onwards. Figure 5 depicts their commitments from the beginning of the conversation. The levels in the right-hand part are analogous to what Grosz and Sidner (1986) refer to as the intentional structure of the discourse (the relevant contrasts with previous topical focus are indicated in italics in the descriptions of the joint commitments). The first joint commitment they entered into is to participate in the Switchboard study and talk about *the news*, a commitment they had made prior to their interaction and honored by answering the phone. Let us call this a Level 1 joint commitment. In the opening utterance of the conversation, Ann suggests they talk about how *Ben* gets

⁴ Hopper (1992) has described how call waiting has created an urgent external summons to the subscriber that overrides rules of conversational interaction.

⁵ We refer to the participant who is interrupted (e.g., Ann in this example) as the target because this person is intentionally interrupted. We refer to the third person who interrupts the target as the source. We refer to people affected by the interruption but not targeted by it as partners. Partners are not always included in the emerging secondary interaction, in which case they become bystanders to that interaction (Clark, 1996).

news. This is a Level 2 joint commitment (Level 2 commitments are linked to Level 1 commitments by what Grosz and Sidner (1986) call dominance relations). Ben implicitly accepts her suggestion by initiating an appropriate next contribution (Clark & Schaefer, 1989): Explaining that he gets most of his news with the radio. Later (10), Ben suggests they talk about how *Ann* gets news, thereby ending their first Level 2 commitment and beginning a new one. Ann replies (11) *well, I can hardly wait for my morning paper to come*. In doing so, she implicitly accepts and amends his suggestion (using *well* to signal this amendment; Schiffrin, 1987), by proposing they talk about how much she *likes* news. How much Ann likes news is a specification of the current Level 2 commitment (how Ann gets news) and thus constitutes a Level 3 joint commitment. In (19), she initiates another topic, how she gets her news *on the radio*. In doing so, she suggests ending their previous Level 3 joint commitment (talking about how much she likes news). Ben goes along with this in 20. In 27, when Ann starts telling Ben about how she gets *actual* news, she is suggesting they end their current Level 3 joint commitment to talk about how she gets news on the radio and begin a new one. But this suggestion never gets accepted because she interrupts herself to ask Ben if he can hold on. At this point, then, Ann and Ben have two active stacks of joint commitments. At Level 1, they are committed to talking to each other about the news. At Level 2, they are committed to talking about how Ann gets the news. And at Level 3, Ann interrupted her own proposal for a new joint commitment. As we will see, the two lower-level stacks *persist* despite the temporary hiatus in the conversation, whereas the self-interrupted proposal is abandoned.

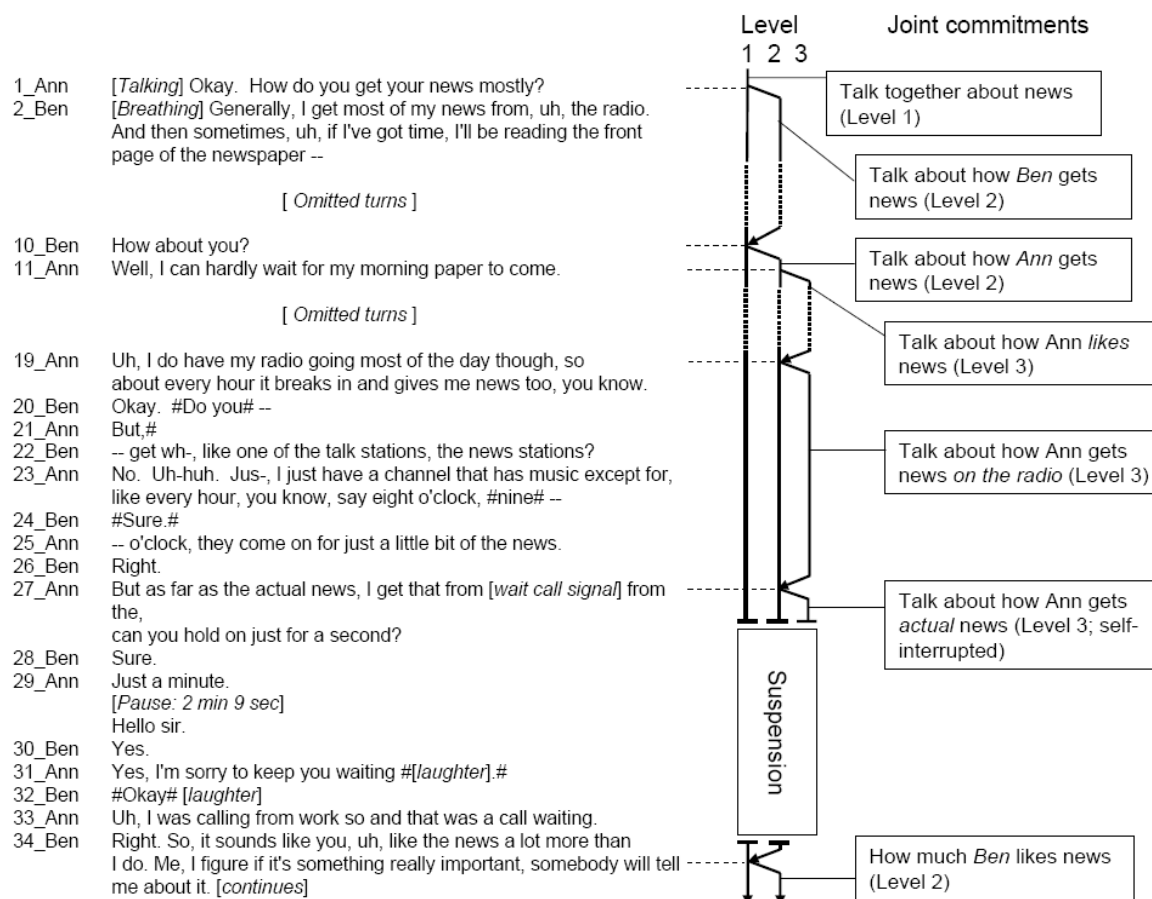


Figure 5. Stacks of commitments in Ann and Ben's conversation.

But that is not all. In entering into these joint commitments, Ann and Ben have bound their resources (e.g., their time). In putting Ben on hold, Ann makes him wait on her and thus incurs a debt towards him. She must signal this appropriately, and we can see this in her initial request to suspend the conversation, *can you hold on just for a second*, which features three forms of negative politeness (Brown & Levinson, 1987): Interrogative form, hedging (*just*), and understatement (*for a second*). In seeking to reinstate the conversation after dealing with the interruption, Ann also performs two redressive acts: apologizing for keeping Ben waiting and justifying her suspension. This extensive politeness is warranted by the long duration of the suspension (over two minutes). Once these redressive acts have been performed, Ben continues the conversation by reinstating the suspended Level 2 commitment (talking about how Ann gets the news), *so, it sounds like you, uh, like the news a lot more than I do*. (In doing so, he automatically reinstates Level 1 as well.) But in his next utterance, he suggests talking about how much *he* likes the news. In other words, he

suggests they embark on a new Level 2 joint commitment.

In suspending and reinstating their conversation, Ann and Ben didn't just stop talking to each other, or start talking again. They went through a series of coordinated acts to ensure that the joint commitments they had entered into were adequately discharged. We argue that the properties of joint commitments give rise to Ann and Ben's actions.

5.4.4 Evidence for the model

As mentioned above, the model must account for possible variations in suspension phenomena. Suspensions could happen at any time during the performance of a joint project. They can be triggered by disruptive events that vary in duration, importance, urgency or in the amount of attention required. These situational factors affect interruptions of individuals (Adamczyk & Bailey, 2004; Trafton et al., 2003). They may also affect the coordination of the joint project and facework. We explore the model with data from two sources. In Study 1, we identified naturally-occurring cases of suspensions of telephone conversations by searching the Switchboard corpus (Godfrey et al., 1992). Our goal was to examine variations on the three steps outlined above and thus to derive testable hypotheses about factors influencing variation. We coded all cases in the corpus to test the hypotheses. In Study 2, we ran an experiment as an additional test. Our studies therefore combine field data with experimental control, which is a desirable approach to the study of language use (Clark & Bangerter, 2004).

5.5 Study 1: Switchboard corpus

5.5.1 Qualitative analyses of suspensions and reinstatements

We searched the Switchboard corpus (Godfrey et al., 1992) for cases of suspensions (see below for details about methods). This corpus contains 2500 conversations between pairs of Texas Instruments employees discussing a pre-specified topic over the phone. Occasionally, the conversations feature naturally-occurring suspensions. We analyzed each case to explore variations in suspension phenomena. Here we present three excerpts, using them to illustrate hypotheses about processes affecting suspensions and reinstatements.

Recall Excerpt 1. The speaker, Ann, suspended the conversation for a long time. Reinstatement was effortful, featuring an availability check and elaborate politeness. In contrast to this prototypical long suspension, some cases were very short. Excerpt 2 shows a

short suspension by the speaker that takes place entirely within her turn.

Excerpt 2: SW 2640

15_Cal # Uh-huh. #

16_Diane # you # know, which they thought first offence, okay, this is, they thought that that was, that was a good thing. And they sentencing him to fifteen years and hum, after it was all over, uh, the jud-, they sit down with the judge and with the other two lawyers, [*to someone in background*] let me come over in just a second, okay, [*to Cal*] and sit down with the judge and with the other two lawyers and they were told that, uh, he would probably serve three,

17_Cal # Uh-huh. #

18_Diane # of # the fifteen, [*continues*]

Here, Cal and Diane are discussing sentencing decisions during trials. Diane has the floor and is telling a story about her husband's experience of jury duty. She interrupts herself to speak to someone in her environment (*let me come over in just a minute, okay*). She resumes talking to Cal with *and* followed by a verbatim repetition of the last phrase before the interruption, followed by *and* before continuing (*they were told that*). She does not warn Cal of the suspension, nor does she perform any facework. In fact, the only indication that *let me come over in just a minute, okay* is addressed to a third person is through prosodic marking evident in the sound file.

Excerpts 1 and 2 contrast in the duration of the suspension. This contrast coincides with differences in both the suspension and reinstatement processes. In Excerpt 2, contrary to Excerpt 1, Diane does not warn Cal in any way. For a projected short suspension, Diane may believe she can get away with not warning him, especially since she has the floor. Indeed, not explicitly marking a brief suspension may cost less collaborative effort (Clark, 1996). There is elaborate politeness in Excerpt 1, whereas there is none in Excerpt 2. This seems reasonable, given that the duration of the unnecessary imposition on a person's time is directly related to the degree of threat to that person's face (Brown & Levinson, 1987). The contrast between such cases leads us to a first hypothesis: The duration of the suspension affects politeness in the suspension process. Longer suspensions lead to more politeness. The duration relevant for testing this hypothesis is the duration of the second step in the model, namely, dealing with the interruption. It corresponds to the amount of time the partner is kept waiting.

Now consider the differences in the reinstatement process. In Excerpt 1, Ben proposes continuing the conversation with a new topic (i.e., a new joint commitment). But in Excerpt 2, Diane resumes her suspended commitment by simply repeating the last phrase she uttered before the suspension. Note the use of *so* in Excerpt 1 and *and* in Excerpt 2. *So* is used to mark topic shifts, whereas *and* is used to mark continuation within a topic (Schiffrin, 1987). Thus, in Excerpt 1 (a long suspension), Ben uses *so* to shift the topic from how Ann gets news to how he likes news, whereas in Excerpt 2 (a short suspension), Diane uses *and* to continue within a topic. The contrast between these two cases leads us to the second hypothesis: The duration of the suspension affects topic reinstatement. Longer suspensions lead to more collaborative effort. The duration relevant for testing this hypothesis is the total duration during which the topic is suspended, because during this time participants engage in verbal and non-verbal activities that may interfere with their memory for the topic and complicate topic reinstatement. This duration corresponds to the duration of the three steps in the model, namely, suspending, dealing with the interaction, and reinstating the interaction.

We now contrast Excerpt 2 with another short suspension in Excerpt 3 (both suspensions have durations identical to within a half-second). The ease with which Diane (the speaker) suspends and reinstates the conversation in Excerpt 2 contrasts with the effort expended in Excerpt 3, where Eva, the person initiating the suspension, does not have the floor.

Excerpt 3: SW 3712

- 6_Eva But I like classical, jazz, uh, you know, uh, contemporary. I don't know what you call it. I just like rock, or easy listening or whatever. Uh, what about you?
- 7_Fiona Uh, a lot the same. I don't like hard rock at all and I, uh, don't like, uh, rap either. I don't care too much for jazz. Sometimes, I do. A few things I have heard that I like but,
- 8_Eva Hang on. Excuse me [*rattling*] [*to dog*] Rocky, no. [*to Fiona*] My dog is getting into trash. [*laughter*] Okay go ahead.
- 9_Fiona [*laughter*] and, uh, I like classical, and I like, uh, a lot of different kinds of contemporary, uh, folksy type -- [*continues*]

Eva and Fiona are talking about kinds of music they like. In 6, Eva is telling Fiona what kinds she likes. She hands the floor over to Fiona with *what about you*. Fiona starts listing

different kinds of music (7). Eva interrupts her (8, *hang on*) and apologizes (*excuse me*). She then attempts to cover the receiver and addresses her dog loudly. She reinstates the conversation with Fiona by explaining the reason for the suspension, laughs and invites Fiona to continue. Fiona laughs and complies. In Excerpts 2 and 3, we can see effects of conversational role (speaker vs. listener) on the suspension and reinstatement process. As a listener, Eva must signal the suspension in a more extensive manner than Diane. This is because Diane only interrupts herself, whereas Eva interrupts someone else. Eva asks Fiona to hang on, excuses herself, deals with the suspension, justifies it and signals to Fiona to continue, all in turn 8. The contrast between Excerpts 2 and 3 leads us to a third hypothesis: Conversational role affects politeness. Listeners display more politeness than speakers.

Excerpt 4 illustrates how participants sometimes tried to defer entering into parallel interactions. It also illustrates politeness not apparent in previous excerpts.

Excerpt 4: SW3045

- 90_Jane Not too much. What kind of, what kind of things do you write?
- 91_Kate Well, um, I was a technical writer for many years, um,
- 92_Jane Oh.
- 93.1_Kate #and my husband and I actually met in a computer company. Um, I was a
tech writer and he was — #
- 93.2_Jane #[A child talks in the background]#
- 93.3_Kate #-- an engineer. And, uh, so I did tech writing -- #
- 93.4_Jane [#The child starts to cry#]
- 93.5_Kate -- # for a number of years#.
- 94_Jane [Talks to the child] #Go talk to # Daddy about it.
- 95_Kate [Laughter].
- 96_Jane Excuse me.
- 97_Kate Oh, #sure#.
- 98_Jane [Talks to the child] #Go on# and talk to Daddy about it [The child stops crying].
Tell Daddy I unplugged it for you. But you don't need to drag it down the hall
[The child cries again] [sigh].
- 99_Kate [Laughter] Got a problem, huh? [Laughter] Um,
- 100_Jane [noise] Daddy, Daddy came home and found her playing with the telephone
that I had unplugged [Laughter].

101_Kate Oh. Trying to figure out what all that was about, huh? [*Laughter*].

102_Jane Yeah.

103_Kate But, um, I have, um, that, that was the majority of my writing although, um, I have also done oh, free lance magazine writing and some educational writing.
[*continues*]

In turn 91, Kate has started telling Jane about her activities as a technical writer. Jane's daughter starts soliciting Jane (93.2) and finally starts to cry (93.4). Only then does Jane take the floor to interact with her. Kate stops talking and laughs. Jane officially suspends the conversation (*excuse me*) and deals with her daughter.

In this excerpt, the participants do not return to the suspended topic immediately. Rather, they embark on a side topic (turns 99 to 102) focused on Jane's daughter. This topic is initiated and ended by Kate, who was the speaker at the moment of the suspension. Such side topics occurred occasionally in the database and were often initiated by the person interrupted. They are a way for the interrupted participant to show interest for the situation leading to the interruption, and thus to display concern for the partner's predicament. In other words, they are a way of symbolically excusing or legitimizing the imposition (by acknowledging its importance to the person suspending) and thus, a particularly elaborate form of politeness. We can see this in the sympathetic language used by Kate in 99 and 101. By this process, the interruption itself can become a topic of conversation, thereby deferring and potentially complicating efforts to reinstate the original topic.

5.5.2 Hypotheses

The examples above suggest that people deal with interruptions according to the model we proposed: They are sensitive to both coordination requirements and interpersonal concerns such as avoiding face threat to their partner. So in performing the three steps we describe, they are indeed trying to accommodate the properties of joint commitments, i.e., stacking, persistence and bound resources. However, it is desirable to obtain quantitative evidence for these observations. Our analyses were guided by the three hypotheses derived from theoretical considerations, the excerpts above, as well as analyses of similar cases.

First, we propose that duration of the suspension, in terms of waiting time for the partner, is positively related to the amount of politeness displayed (Hypothesis 1). This is expected because longer waiting times directly increase threat to negative face. This

hypothesis follows from the fact that joint commitments bind resources of participants. Second, we propose that the duration of the suspension, in terms of the suspension of topical talk, is positively related to collaborative effort in reinstating the topic (Hypothesis 2). Longer suspensions allow both participants to get into potentially complex secondary tasks. Research on cognitive processes involved in interruptions suggests that engaging in such tasks may interfere with memory for goals related to the primary task (Altmann & Trafton, 2002; Hodgetts & Jones, 2006). If participants are unable to reconstruct where they left off exactly, they may abandon the current stack of commitments and revert to a previously grounded stack. We expect that they signal this transition with specific discourse markers. In contrast, with shorter suspensions, memory for goals should be less taxed. Thus, shorter suspensions should exhibit more coherent topic reinstatement, especially characterized by more verbatim repetition (Clark & Wasow, 1998) and more fluent discourse. The second hypothesis follows from all three properties of the model. Third, we propose that politeness varies according to conversational role (Hypothesis 3). Speakers have more control over the moment to initiate a suspension than listeners. And speakers who initiate a suspension are interrupting themselves, which is less face-threatening than interrupting one's partner. Thus, they do not need to exhibit as much politeness in suspending as listeners.

5.5.3 Method

Identifying suspensions. Suspensions were located by searching for typical key words: *hold on* (and variations, e.g., *hold on a sec*), *just a minute* (and variations, e.g., *just a moment*), and apologies, e.g., *excuse me*. We also searched for transcript annotations indicating that a third person is being addressed. In order to be sure that our search procedure was not biased by the key words used, we compared it to manual identification of suspensions in a sample of 220 conversations. Twenty-three cases were found by both manual coding and the search procedure; there was disagreement on 1 case. This corresponds to a Cohen's kappa value of .98, indicating excellent agreement (Fleiss, 1981). The search of the whole corpus returned 140 cases. After excluding some cases where it was not clear that the conversation was suspended, we were left with a final sample of 107 cases.⁶

Data preparation. We corrected transcripts using the sound files. This was necessary

⁶ In the sample, the 107 suspensions come from 96 conversations. Thus, although there were 11 conversations that featured two suspensions each, we consider the potential inflation of degrees of freedom to be negligible.

because the corpus was not originally created to study suspensions, and transcription accuracy around suspensions was often approximate. We retained several transcription conventions from the Switchboard corpus. Speakers are identified by arbitrary first names. Speaker turns correspond to those in the original transcripts. Corrections sometimes required inserting speaker turns. To preserve the original numbering, we indicate these with decimals (e.g., turn 20.1 is inserted after turn 20 in the original transcript). Onset and offset of simultaneous speech is indicated by "#". Continuing speech is indicated by "--". Comments are bracketed.

Coding. Interrater agreement was assessed for variables involving subjective assessments by double-coding 22 cases (21 % of the database). For ordinal variables, we computed Cohen's kappa (Fleiss, 1981), assessing whether it was acceptable ($> .70$) and significantly different from zero. Kappa values are reported below for each variable. For numerical variables, we computed correlation coefficients.

We used Praat 4.3.01 (Boersma & Weenink, 2007) to measure the duration of suspensions with a precision of one tenth of a second. We report two measures of duration: The suspension of the interaction (SI) and the suspension of the topic of conversation (ST). SI represents the duration of the second step in our generic model, i.e., dealing with the interruption. It begins with the offset of the last word when the person suspending stops talking with the partner. It ends with the onset of the first word when the suspender resumes talking with the partner. ST is a measure of how long the topic is suspended. It represents the duration of all three steps in our model. In other words, it begins with the offset of the last word of topical conversation and ends with the onset of the first word of reinstated topical conversation. Typically, ST encompasses SI. In other words, the difference between ST and SI is equal to the duration of negotiation of topic suspension and reinstatement. The relationship between ST and SI is shown in Figure 6, using the example of Excerpt 1. As discussed above, we distinguish between these measures because they may be differentially related to our dependent variables. SI, which directly translates into idle waiting time for the partner, is probably directly related to face threat. However, ST, which includes SI plus any interactional work done to get out of and back into the interaction (e.g., facework), may be a better predictor of collaborative effort in reinstating the topic, because this additional work may make it more difficult for participants to remember where they were in the conversation.

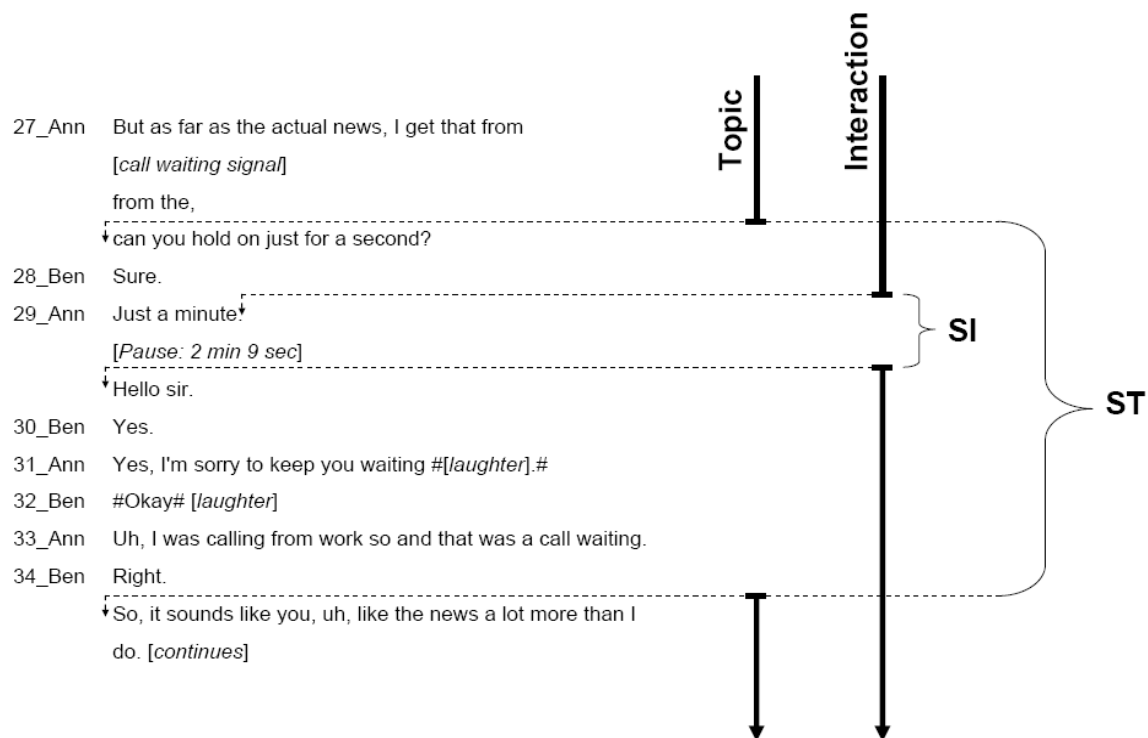


Figure 6. Onsets and offsets of suspension of interaction (SI) and suspension of topic (ST).

We coded conversational role, distinguishing between speakers and listeners, depending on who owned the floor at the onset of the suspension. Interrater agreement was perfect ($\kappa = 1.00$, $p < .0001$).

We coded the number of politeness acts in the entire suspension process by both participants before and after the suspension. Politeness acts were defined according to Brown and Levinson (1987). The basic feature is a deviation from maximally efficient (i.e., minimal) communication in the sense of Grice's maxims (1975). Of course, these acts may also serve other purposes rather than face management. However, we did not count utterances whose main function is information-giving or seeking (e.g., "where were we?") as politeness acts. In the current corpus, politeness acts included *hold on*, interrogative form (*can I ask you to*), *please*, expressions of time (*just a sec*, *just a minute*), justifications and apologies. For each suspension, we coded whether or not each act was present (1 or 0) and tallied them, thus creating an interval-scaled measure of the amount of politeness. Interrater agreement was high for coding presence or absence of each act (all κ s $> .75$, all p s $< .0001$). As another indicator of politeness, we also computed the number of turns involved in

politeness acts before and after suspension. Number of turns is a meaningful indicator because it measures the extent of exchanges between participants, and thus corresponds to Goffman's (1955) original perspective on facework (see also turns 31-34 in Excerpt 1). Interrater agreement was high, $r(22) = .87, p < .001$. We also counted the number of words used for politeness acts. Interrater agreement was excellent, $r(22) = .98, p < .001$.

We assessed reinstatement by analyzing the first topical utterance after the reinstatement of the interaction. We coded three variables. First, we coded each utterance as either *globally* or *locally* coherent (Crow, 1983) with the last topical utterance preceding the suspension. "Local" was coded when the utterance was directly related to the last utterance, and "global" was coded when it was not, i.e., when participants reverted to a lower-stacked commitment ($\kappa = .82, p < .0001$). This variable captures whether or not a joint commitment is continued (local) or abandoned in order to revert to a previous one (global). Second, we coded whether or not utterances were verbatim repetitions of the last topical utterance preceding suspension. Our criterion for verbatim repetition was at least two consecutive identical words in both utterances ($\kappa = .65, p < .001$). Third, we coded for the use of horizontal (*yeah, and*) and vertical (*okay, well, so, but, anyway*) markers according to Bangerter and Clark's (2003) classification. Horizontal markers are used to signal horizontal transitions, i.e., within a particular joint project. Vertical markers signal vertical transitions, i.e., starting or ending joint projects. Horizontal markers should be used more frequently with short suspensions than long ones, because participants will tend to continue where they left off rather than revert to a previous joint commitment. When more than one marker was produced (e.g., *but, and*) we coded the last one (all κ s between .65 and 1.00, all $ps < .001$).⁷

As an example of how we coded reinstatement variables, consider, in Excerpt 1, the initial topic-reinstating utterance: *So, it sounds like you, uh, like the news a lot more than I do*. It is globally coherent with the last topical utterance before the suspension, does not feature verbatim repetition and features use of a vertical marker (*so*).

5.5.4 Results

Descriptive analyses are shown in Table 3. In what follows, we present analyses of

⁷ Prior research (Clark & Wasow, 1998) suggested that the cognitive effort of reinstating a topical utterance could be indicated by variations in disfluencies. We analyzed this in both studies, but did not find any significant differences according to the main independent variables.

the relationship between duration, conversational role and our dependent variables, politeness and collaborative effort to reinstate the topic.

Table 3.

Descriptive data for main study variables (N = 107)

	%	<i>M</i>	<i>SD</i>
Source of interruption (total = 100%)			
Children	43		
Unknown third person	20		
Incoming call	20		
Self-interruption	10		
Other (e.g., technical problem)	7		
Duration (seconds)			
Suspension of topic (ST)		10.3	10.8
Suspension of interaction (SI)		6.0	8.1
Conversational role of initiator			
Speaker (Listener)	58 (42)		
Politeness ¹			
<i>Hold on</i>	39		
Interrogative form	16		
<i>Please</i>	2		
<i>Just a [sec, minute, etc.]</i>	45		
Justification	49		
Apology	24		
Reinstatement			

Local coherence (global)	41(59)
Horizontal marker (vertical)	34(66)

¹Values indicate the percentage of cases where the feature was present.

Hypotheses 1-3. Because Hypotheses 1-3 are directional, we report one-tailed p values in what follows, accompanied by measures of effect size (ϕ coefficients for chi-square tests and Cohen's d for t -tests). For Hypothesis 1, the duration of SI correlated with the amount of politeness acts, $r(107) = .47$, $p < .0001$, as well as the number of turns of politeness, $r(107) = .46$, $p < .0001$, and the number of words of politeness, $r(107) = .24$, $p = .007$.

As predicted in Hypothesis 2, the duration of ST affected topic reinstatement. We dichotomized duration of ST into short ($M = 3.5$ sec) and long suspensions ($M = 17.2$ sec) using a median split (7.1 sec). Locally coherent utterances at reinstatement followed short suspensions 59% of the time, but followed long suspensions only 23% of the time, $\chi^2(1, N = 107) = 14.81$, $p < .0001$, $\phi = .37$. Use of vertical and horizontal markers also varied with duration. Topical reinstatement after short suspensions featured horizontal markers 44% of the time, compared with only 26% of the time after long suspensions. However, this difference was only marginally significant, $\chi^2(1, N = 67) = 2.54$, $p = .092$, $\phi = .20$. Verbatim repetition followed long suspensions 4% of the time, but followed short suspensions 22% of the time, $\chi^2(1, N = 107) = 8.0$, $p = .004$, $\phi = .27$.

For Hypothesis 3, we found that suspensions by listeners featured more politeness acts ($M = 2.1$, $SD = 1.6$) than those by speakers ($M = 1.5$, $SD = 1.5$), $t(105) = 1.81$, $p = .037$, $d = .39$, as well as more turns involving politeness (M s 3.8 vs. 2.2 turns, SD s 3.2 and 2.7 respectively), $t(105) = 2.73$, $p = .004$, $d = .54$, and more words involving politeness (M s 20.7 vs. 11.2 words, SD s 26.1 and 13.5 respectively), $t(61.1) = 2.2$, $p = .015$, $d = .46$.

5.5.5 Discussion

We found (Hypothesis 1) that the longer the suspension was, the more elaborate was the politeness. This was established by computing SI, i.e., the amount of time the other participant is kept waiting. This supports the proposition in our model that entering into joint commitments binds resources of participants and that suspending them creates an obligation that must be compensated in direct proportion to the degree of face threat. We

also found (Hypothesis 2) that the longer the suspension, the more collaborative effort is required to reinstate the topic. This was established by computing duration as ST, i.e. the amount of time the other participant is kept waiting plus the amount of time expended in politeness before reinstating the topic. Thus, longer suspensions lead to more politeness, which itself constitutes a supplementary interactional task that may further complicate participants' efforts to reinstate the topic, especially if they discuss the cause of the interruption, as in Excerpt 4. Finally, we found (Hypothesis 3) that the conversational role of the person initiating the suspension affected the process. It was more effortful for listeners to suspend than speakers, because they have to deal with the delicate issue of interrupting the speaker, which constitutes a face threat in itself. This was evident in the number of politeness acts, but also in the number of turns. In other words, when listeners suspend, they tend to ask for permission, apologize and so on. These acts get acknowledged by the other participant and emerge as adjacency pairs, thereby, increasing, for example, the number of turns taken to suspend.

Although the evidence for our model is suggestive, in a field study, it is difficult to exclude extraneous variables that may be confounded with the independent variables of interest. For example, it is evident from Table 1 that several different kinds of interruptions occurred. It is desirable to obtain experimental evidence for our findings. In Study 2, we recreated the Switchboard corpus phenomena in a controlled laboratory setting.

5.6 Study 2: Experimental manipulation of Duration and Conversational Role

In Study 2, we brought our phenomenon into the laboratory. Unacquainted pairs talked about a prespecified topic over the phone. We interrupted one participant, the target, twice. We manipulated duration (short versus long; within-subjects) and conversational role (speaker versus listener; between-subjects) to test effects on politeness and reinstatement processes. We tested Hypotheses 1-3 from Study 1.

A problem we had to solve was how to create natural, serendipitous interruptions. In an experiment, targets may not feel responsible for suspending the interaction. They might thus perceive less face threat and make less effort to be polite, or even explicitly attribute the responsibility for the interruption to the experimenter. So we made up a cover story to lead targets to believe they were at fault because they did not adequately complete a task

that preceded the conversation. The cover story provided a reason for the experimenter to disturb targets during their conversation and a reason for targets to attribute the cause of disruption to themselves and not to the experimenter. To avoid "cancelling out" the face threat, we interrupted the same person twice. We set up the cover story by asking participants to fill out two ostensibly unrelated questionnaires before the conversation. During the conversation, the experimenter entered the target's room and pretended that it was impossible to code some answers in one of the questionnaires because of omissions or lack of clarity in the target's responses. To answer the experimenter, targets had to suspend their conversation, address the matter and then reinstate their conversation. This way, we interrupted targets at a specified point (when they were speaking or when they were listening) and for a specific duration (short or long).

5.6.1 Hypotheses

We tested Hypotheses 1-3 again: Longer suspensions should lead to more politeness (Hypothesis 1) and more collaborative effort in reinstating the topic (Hypothesis 2). Conversational role should affect politeness (Hypothesis 3): Listeners should be more polite than speakers.

5.6.2 Method

Design. The design was a 2 X 2 mixed factorial plan with duration (short vs. long) as a within-subjects factor and conversational role when interrupted (speaker vs. listener) as a between-subjects factor. Thus, for all pairs, the target was interrupted twice during the conversation, once for a long time and once for a short time (order was counterbalanced). And for half the pairs, the targets were to be interrupted only while they were speaking, and for the other half, only while they were listening.

We found out after the experiment had been completed that the procedure (see below) for interrupting targets in a particular conversational role was not reliable. Between the time when the experimenter had determined the speaker role and the time he entered the room, the floor had often changed. Inspection of videotapes revealed that some targets in a speaker role stopped talking when the experimenter entered the room, but before he interrupted them. This apparently was perceived by their partners as an invitation to take the floor. We take this problem as evidence of the subtlety of conversational interruptions and the difficulty of studying them in a controlled setting. As a result, then, conversational

role was excluded from analyses, and we were not able to test Hypothesis 3.

Participants. Forty-eight unacquainted native French speakers participated in pairs in exchange for 10 Swiss Francs. Allocation to condition and to the target role was random.

Procedure and materials. We brought participants to separate rooms upon their arrival. They filled out consent forms and then were informed about the (bogus) questionnaire and the phone conversation task. For the questionnaire task, participants responded to two separate forms. First, they judged a list of 39 adjectives on a three-point scale. Then, they described an ambiguous picture from the Thematic Apperception Test in a one-page story. After these tasks were completed, the experimenter told participants that their answers would be coded during the telephone conversation. As an aside, he said he would inform them in case of a problem. This set the stage for a credible interruption later on.

For the conversation task, participants were asked to talk about avian influenza (a salient media topic at the time) for at least 12 minutes. The topic was ostensibly drawn from a selection of current news topics. Participants conversed using hand-held USB phones and Voice over Internet Protocol (VoIP) software, which automatically recorded the conversation. We also installed a video camera with a wide-angle lens in the target's room. Participants knew they were audio and video recorded but not that they were monitored in real time. After participants had reinstated topical talk after the second interruption, the experimenter stopped the experiment and debriefed the participants. None of the participants suspected that the interruptions had been staged.

We interrupted participants twice, after approximately 4 and 10 minutes of the conversation. To interrupt a participant in a particular conversational role, the experimenter monitored the conversations, timing his entry into the targets' room to disrupt them while they were either speaking or listening. We manipulated the duration of the suspension by bringing up a problem related to one of the bogus questionnaires. The short interruption was based on the adjective checklist. The long interruption was based on the picture description. We pre-tested these interruptions so that they would last approximately 10 and 30 seconds, respectively. The cover story followed the same script in all conditions. The experimenter opened the door, entered the target's room, and walked up to them saying *I'm sorry, I'm coding your answers and there is a problem with* followed by either *the items* (short condition) or *the description* (long condition). For the short condition, while the

participants were conversing, the experimenter copied responses from the target's checklist onto a new list that included an additional item. This led the targets to believe they had inadvertently missed that item while responding. When interrupting, the experimenter followed the above script and then added *you missed an item, here*. For the long condition, while the participants were conversing, the experimenter searched the targets' stories for an ambiguous statement. When interrupting, he followed the above script and then added *there is a sentence I don't understand. Can you explain what you mean by* and repeated the specific phrase. The targets typically complied. The experimenter acknowledged the explanation. Once sufficient time had elapsed, the experimenter said *all right I see* and repeated what he understood. In both cases, once answers had been given, the experimenter said *okay thank you*, and left the room.

Manipulation and data checks. We computed the time of each suspension by indexing the same SI and ST durations as in Study 1. For SI, short suspensions were significantly shorter ($M = 12.1$ seconds, $SD = 5.7$) than long suspensions ($M = 35.7$, $SD = 13.3$), $t(1,20) = 9.0$, $p < .0001$, $d = 2.31$. The same was found for ST (short: $M = 25.2$, $SD = 6.9$; long: $M = 56.3$, $SD = 23.6$), $t(1,20) = 5.9$, $p < .0001$, $d = 1.79$.

There were four occurrences where targets did not suspend. Three persons in the short condition managed to handle the interruption without suspending. One person in the long condition included the partner into the discussion of the interruption and never came back to the topic of avian flu (see the similar case in Excerpt 4 where participants digressed at length before reinstating the topic). These behaviors can in fact be interpreted as politeness and will be addressed in the discussion. In the end, the sample was composed of 20 interruptions in the short condition and 23 interruptions in the long condition.

Measures. As in Study 1, we coded variables related to politeness and reinstatement. All variables involving subjective assessments were coded by two judges for all cases.

For politeness, we counted the number of acts, turns and words as in Study 1. Interrater agreement was high (all rs between .80 and .98, all $ps < .001$).

For topic reinstatement, as in Study 1, we coded the first topical utterance after reinstatement of the conversation. First, we coded whether or not it featured meta-communication about where participants were in the conversation (e.g., *where was I, you were saying*), $\kappa = .94$, $p < .0001$. Meta-communication has a coordination purpose. It reveals uncertainty in recalling a suspended topic, but at the same time it explicitly signals

the intent to continue the joint task and solicits help from the partner (Goodwin, 1987).⁸ Second, as in Study 1, we coded the coherence (local or global) of the first utterance with the last one uttered before the suspension ($\kappa = .79, p < .0001$). Third, to measure verbatim repetition, we coded the proportion of unique words that were repeated in the first topical speaking turn compared to the last topical speaking turn preceding the suspension. This yields a ratio-level measure of verbatim repetition that is more sensitive than the dichotomic measure we used in Study 1. This additional precision is necessary because the sample size in Study 2 is smaller. We did not code discourse markers as in Study 1, because we are not aware of any systematic classification of their vertical or horizontal use for French.

5.6.3 Results

Again, because Hypotheses 1-3 are directional, we report one-tailed p values in what follows. As predicted in Hypothesis 1, long suspensions featured more turns involving politeness ($M = 7.8, SD = 5.9$) than short ones ($M = 4.2, SD = 2.0$), $t(19) = 2.8, p = .006, d = .82$. Long suspensions also featured more words expended for politeness ($M = 43.6, SD = 39.1$) than short ones ($M = 21.4, SD = 11.4$), $t(19) = 2.6, p = .010, d = .77$. Finally, long suspensions did not feature more polite acts ($M = 2.4, SD = 1.0$) than short ones ($M = 2.1, SD = 1.4$), $t(19) = 1.13, p = .137, d = .25$.

As predicted in Hypothesis 2, longer suspensions led to more collaborative effort in topical reinstatement. Meta-communication occurred more often after long than short suspensions, 79% vs. 47%, McNemar (1, $N = 19$) = 3.13, $p = .035, \phi = .41$. Verbatim repetition was more pronounced in shorter suspensions than longer ones: A larger proportion of words from the last topical turn preceding the suspension were repeated in the first topical turn for short suspensions ($M = 36\%, SD = 23\%$) than for long ones ($M = 16\%, SD = 15\%$), $t(19) = 3.04, p = .004, d = 1.03$. Topic-reinstating utterances following short suspensions were locally coherent 47% of the time, compared with 21% for long suspensions, McNemar (1, $N = 19$) = 1.78, $p = .09, \phi = .31$.

5.6.4 Discussion

In this study, we tested results from Study 1 in an experimental setting. Hypotheses 1

⁸ We had planned to analyze metacommunication for the Switchboard corpus as well but there were only 5 cases in the data.

and 2 were supported: The duration of the suspension influenced both politeness and collaborative effort in reinstatement.

Long suspensions increased verbal effort for politeness in terms of turns, and words (Hypothesis 1). However, contrary to Study 1, we did not find a difference in terms of the number of acts. This may be because of the within-subjects design where the same participant was interrupted twice within a few minutes. Some kind of lexical entrainment (Brennan & Clark, 1996) may have occurred, causing targets to re-use similar forms of politeness between the first interruption and the second, and therefore counteracting potential effects of duration.

Longer suspensions decreased the proportion of repeated words and increased the frequency of meta-communication when the topic was reinstated (Hypothesis 2). They also led to more globally coherent topic continuations, i.e., reverting to an earlier joint commitment.

We were unable to reliably manipulate conversational role. It was difficult to interrupt speakers because they often relinquished the floor between the moment the experimenter entered the room and the moment they were explicitly solicited. This is an indication of the subtlety of the suspension phenomenon. Thus, we were not able to replicate results relative to Hypothesis 3. The results found in Study 1 are therefore provisional.

A handful of targets managed to complete the interrupting tasks without suspending the conversation. This indicates that targets perceived the interruptions as *bona fide*, and, more importantly, that they took the conversation with their partner seriously enough to refuse to suspend it. In fact, refusing to suspend corresponds to a politeness strategy that is employed when the face threat is considered too high, namely simply not to execute the act in question (Brown & Levinson, 1987).

5.7 General discussion

Interruptions of joint activities are commonplace, but their processes and effects are not well understood. We proposed a model that describes the contingencies involved in the suspension and reinstatement of joint activities. Our model is based on the notion that when people converse, they create joint commitments. Joint commitments have three properties, binding resources, stacking, and persistence (Clark 2006). These properties explain why joint

commitments are hard to suspend without costly adjustments: Face is threatened and the grounding process is disrupted. These adjustments require polite acts and collaborative efforts to reinstate the joint activity. Our model accounts for these processes at suspension and reinstatement.

In Study 1, we described qualitative variations in the suspension and reinstatement processes, and derived three hypotheses about factors influencing politeness and reinstatement. Hypothesis 1 posited that waiting time of the partner (SI) would predict face threat and therefore politeness. Hypothesis 2 posited that the total duration of topic suspension (ST), i.e. the three steps in the model, would predict collaborative effort in reinstating the topic (Hypothesis 2). We further explored facework processes by examining effects of the conversational role of the initiator of the suspension. Hypothesis 3 posited that self-interruption would be less face-threatening than having to interrupt while the partner has the floor (Hypothesis 3). Results showed that duration of the suspension increased politeness and the effort to reinstate the task. We also found that conversational role affected politeness: it was more difficult for listeners to suspend than speakers. In Study 2, results showed again that longer suspensions led to more politeness and effort at reinstatement. These results support the coordination costs portrayed in our model for suspending joint activities.

A strength of our model is that it is built on studies that combined both natural and experimental data, a desirable combination for discovery and testing of linguistic phenomena (Clark & Bangerter, 2004). On the other hand, a limitation of the experiment is that we failed to systematically interrupt targets in the speaker and listener roles. That parameter was dropped from our analyses; thus we were not able to replicate Hypothesis 3. Also, we had a small sample in Study 2; this may have resulted in insufficient power to test some hypotheses. Nevertheless, our overall results supported the model.

Although our model integrates important variables affecting suspensions, there are several other factors that we were not able to take into account. We discuss these in what follows. Future research might explore how they affect joint commitments and variables like politeness and topic reinstatement.

First, it is worth exploring how targets compute face threat to their partners in real time. Given enough time, targets may be able to prevent face threat by *anticipating* the duration of a suspension. By this view, they would roughly estimate the duration of their

partners' waiting time and perform appropriate politeness acts in advance. Alternatively, time pressure to switch from the primary activity to the second activity might prevent them from properly anticipating face threat (or they may underestimate waiting time). In such cases, partners may *compensate* for face threat after the suspension. All other things being equal, it seems that people would prefer anticipation to compensation (Clark, 1994).

Second, it is worth exploring how partners on hold may engage in other activities depending on the waiting time of the suspension. The suspensions we studied were brief, ranging from a few seconds to a few minutes. What would happen with longer suspensions? If the suspension remains brief, partners may simply wait. If so, they may have idle mental capacity, and thus be able to keep in mind the active stack of the conversation, thereby acting as a kind of placeholder. With longer suspensions, partners may themselves engage in other activities (Miyata & Norman, 1987) and therefore be less able to support reinstatement. Also, with longer suspensions, at some point, initiators of the suspension may feel obliged to check back with their partners, and eventually provide them with more redressive acts. Companies are sensitive to this phenomenon, and so when callers are waiting to get through help lines, they regularly get automatic messages that feature polite acts, such as apologies, justifications, and information about the approximate remaining waiting time. Finally, with even longer suspensions, initiators may feel obliged to release their partners from the interaction, allowing them to return to their own business.

Third, it is worth exploring the strength of a joint commitment and its effect on reinstatement of the primary task. The strength of a commitment may depend on the amount of time accumulated in the joint activity, which could decrease partners' initial commitment level and hence decrease the need for reinstatement. For example, participants might use the opportunity afforded by an interruption to exit a conversation that has been going on for a while (Albert & Kessler, 1976). There were cases in the Switchboard corpus where partners did not resume the topic, but ended the conversation after the interruption had been dealt with. They did not reinstate the topic, but nevertheless, they still had to commit together to ending the conversation (Schegloff & Sacks, 1973). The strength of a joint commitment to interact may also be low from the outset. Imagine two strangers chatting with each other while waiting in line at a checkout counter. When it is one participant's turn to be served, it is unlikely that the conversation will resume afterwards (we thank an anonymous reviewer for raising this point). In this case,

the commitment level is low because both participants are actually passing time while waiting for committing to a more important purpose.

Fourth, it is worth investigating how varying levels of co-presence between the target, the partner and the source of the interruption affect the suspension and reinstatement processes. We suggest that co-presence affects the participants' mutual awareness of the primary and secondary interactions. This in turn affects how responsibility for attending face wants is distributed among the participants. Our data are derived from phone conversations, where target and partner lack co-presence and mutual visibility (Clark & Brennan, 1991). In this situation, mutual awareness is limited and prevents partners from knowing about the source of an interruption in the target's environment. Thus, it is likely that the responsibility for attending to face wants will lie with the target. But, in situations where target, source and partner are co-present, mutual awareness is not limited. Therefore, it is likely that less explicit facework and justifications are needed. Though, in this case, the responsibility for facework may probably lie with the source, who is directly accountable to the target, but also to the partner. Other configurations of co-presence (e.g., a co-present target and partner with a remote source or a co-present source and target with a remote partner) will likely lead to a different distribution of responsibility for managing face wants.

Our findings have implications for theory on interruption management. McFarlane and Latorella (2002) have developed a detailed and yet general model of interruptions in HCI, but it does not deal specifically with human-human interruptions of collaborative tasks. One of our findings is that, for interruptions of joint activities, facework constitutes a supplementary task in addition to the primary and secondary tasks that have been studied in previous work. As an additional interactional sequence that must be managed by participants, it consumes time and cognitive resources and may further complicate reinstatement of the task. Our results also have implications for research on how people manage multiple collaborations. In everyday work situations, people flexibly interact with multiple partners, both in sequence and in parallel (Fussell, Kiesler, Setlock, Scupelli, & Weisband, 2004, Su & Mark 2008). This makes interruptions of collaborative tasks, and thus suspensions and reinstatements, a commonplace but underestimated phenomenon (Perlow, 1999). As of yet, little is known about how these processes impact collaborative work.

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Chapter 6 – Suspending and reinstating conversational narratives to deal with third-party interruptions (Study 3)

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6.1 Abstract

Participants manage interruptions in joint activities by suspending the activity, addressing the interruption, and reinstating the activity. This involves two important processes: managing the face of one's partners and collaboratively reconstructing the topic. We hypothesized that the duration of the interruption affects both facework (politeness) and topic reinstatement, and that the conversational role of the person interrupted (the target) affects facework. In an experiment, we interrupted pairs of participants engaged in narrating personal stories. One person narrated a story while the other listened. Participants then switched roles. We manipulated the duration of the interruption (short versus long interruptions). We also manipulated the conversational role of the target (narrator versus listener). Listeners were more polite than narrators. Longer suspensions caused more effort in reinstatement than short suspensions. But participants were not more polite when suspensions were long. Results highlight the complexity of interpersonal processes involved in suspending and reinstating collaborative activity.

6.2 Introduction

Interruptions of conversations by third parties are commonplace in everyday life. For example, two persons conversing in a restaurant might be interrupted by the waiter arriving to take their order. Or a doctor counselling a patient during a medical visit might be interrupted by a phone call from another patient. In such situations, the participants in the conversation have to manage both their original conversation and the interrupting event. They typically do so by suspending the original conversation (hereafter the *primary* conversation), dealing with the interrupting party (thereby initiating a *secondary* conversation), and then reinstating the primary conversation. Chevalley and Bangerter (in

press) described the complex issues involved in the suspension and reinstatement of conversations. One issue is the impact of the interruption on the primary conversation, especially on the reconstruction of the topic that was interrupted. Another is how participants manage each others' face (Brown & Levinson, 1987) when suspending the interaction. Here, we report a study that further explored these issues.

Research on task interruptions of individuals has documented their cognitive and behavioral consequences for ongoing task performance. Interruptions decrease performance due to the costs of task switching (e.g., errors, lost time; Monsell, 2003). Switching costs often increase with the duration of the interruption (Hodgetts & Jones, 2006a, but see Gillie & Broadbent, 1983). This is due to time-dependent decay of memory for task goals (Altmann & Trafton, 2002). Another factor affecting how disruptive an interruption is concerns the point in a task where the interruption occurs, with mid-task interruptions being more disruptive than end-task interruptions (Adamczyk & Bailey, 2004; Monk, Boehm-Davis, & Trafton, 2002). To a certain extent, individuals are able to defer interruptions to minimize their disruptive impact. In other words, they decide whether and when to interrupt a task based on considerations of the relative costs and benefits involved (McFarlane & Latorella, 2002). For example, participants in a computerized planning task used an eight-second interval between the onset of a task interruption and the onset of the secondary task to memorize the current state of the task in order to facilitate resumption (Trafton, Altmann, Brock and Mintz, 2003).

Conversations are partly similar and partly different to individual tasks. Like individual tasks, participants' memory for where they were in the conversation may suffer from long interruptions. But unlike individual tasks, participants in interrupted conversations not only need to reconstruct their individual memories of the topic of the conversation, but they also need to coordinate those memories by reconstructing common ground about the topic (Horton & Gerrig, 2005). They may be able to rely on the help of other participants to do this (Goodwin, 1987). Another difference between conversations and individual tasks is that suspending a conversation with another person is potentially insulting to that person. Typically, only some participants in a conversation are solicited by a third party (we refer to them as *targets* in what follows). Thus, targets need to manage potential face threats (Brown & Levinson, 1987) to their partners when suspending conversations. Suspending a conversation implies keeping partners waiting, which threatens their negative face, i.e., their

right to freely dispose of their time. This leads targets to perform redressive behaviors (politeness), such as asking permission, apologizing for the interruption, or explaining why they need to suspend (Chevalley & Bangerter, in press).

Chevalley and Bangerter (in press) proposed a model of conversational suspensions and reinstatements. It was based on the assumption that participants in conversation establish a series of *joint commitments* (Clark, 2006). Joint commitments are agreements among participants that specify what they will do in a particular interaction, including aspects like the participants' roles, the actions they are to perform, when and where they are to do them. They arise because participants need to coordinate these aspects to interact successfully. They may be agreed upon explicitly (as when two people agree to meet for lunch) or tacitly (as when one participant starts telling a story and the other tacitly accepts by adopting the role of listener). Joint commitments have three important properties. First, they are established sequentially (Sacks, Schegloff, & Jefferson, 1974), but because conversation is also hierarchically organized (Clark, 1996, Bangerter & Clark, 2003), each successive joint commitment is stacked up on the previous one. For example, in the restaurant conversation example above, the participants previously committed themselves to meeting for lunch at a restaurant. While waiting to order, they committed themselves to talk about a particular topic. Thus, this commitment was established after the commitment to meet for lunch, and is stacked up on it. Second, joint commitments at a lower-level persist even if higher-level commitments are interrupted or abandoned. For example, the commitment to lunch persists even if the commitment to discuss a particular topic is abandoned. Third, joint commitments bind resources of participants. In committing themselves to meeting for lunch, participants agree to invest resources (e.g., time, money, attention) to make the meeting a success. In doing so, they temporarily renounce part of their autonomy and their ability to engage in other activities (Goffman, 1967).

These properties of joint commitments explain why conversational suspensions and reinstatements constitute complex and often effortful activities. They suggest that participants will try to reconstruct the topic that was interrupted (because their commitment to talk about that topic persists). If they are unable to do so, they may revert to a lower-level (i.e., more encompassing) topic they had previously initiated. And the fact that participants bind their resources suggests that suspending a conversation requires targets to compensate their partners for keeping them waiting while they engage in another

interaction. This compensation is typically accomplished by means of politeness acts designed to mitigate face threat. As an illustration of how these processes actually get accomplished in conversation, consider the following excerpt from the Switchboard Corpus (Godfrey, Holliman, & McDaniel, 1992). In this corpus, pairs of participants were recorded while they talked on the telephone about a predefined topic. Because these conversations occurred in the homes and workplaces of the participants, they sometimes featured naturally-occurring interruptions. The excerpt involves a conversation between Ann and Bob on the topic of “lawn and garden” that is interrupted by a third party (Carl) located in Ann’s environment (for transcription conventions, see the Method section).

Excerpt 1: Conversation 2984 Switchboard corpus

- 15_Bob And, uh, but grew up in, uh, Iowa on a farm with a considerably different philosophy in terms of [laughter] lawn and garden --
- 16_Ann Hi [to Carl].
- 17_Bob -- work. Uh, and uh,
- 18_Ann Can you hang on just a minute?
- 19_Bob Yeah.
- 20_Ann Thank you
- 20.1_Carl Has shoebox called me back
- 20.2_Ann [To Carl] I have no idea. He didn't broadcast.
- 20.3_Carl No right, we did it again
- 20.4_Ann [To Carl] Thank you. Uh-huh. [To Bob] I'm sorry.
- 21_Bob No.
- 22_Ann Go ahead.
- 23_Bob So, uh, [pause 1.60 s lipsmack] uh, not, not growing up familiar with here, uh, uh, when I get a chance I listen to that Neil #Sperry and do that [laughter].#

At the beginning of the excerpt (Turn 15), Bob has the floor, and is talking about where he grew up. In Turn 16, Ann starts a secondary conversation with Carl (it is not clear whether Ann or Carl is the actual initiator). This obviously disrupts Bob’s Turn 17 (*uh, and uh*). Ann asks permission to suspend the primary conversation (18), Bob accepts (19), and Ann thanks him (20) before fully engaging in the secondary conversation (20.1 to 20.4) with Carl. In 20.4, Ann reinstates the primary conversation by apologizing to Bob (*I’m sorry*). Bob indicates the apology was not necessary (21, *no*). Ann invites Bob to continue (*go ahead*, 22).

He takes up the topic in turn 23 after some disfluent speech (*So, uh, {pause 1.60 s lipsmack} uh, not*) by producing a summary (*not growing up familiar with here*) of his last topical turn before the suspension.

In this excerpt, it is clear that Ann and Bob do not just stop talking with each other. Rather, they need to coordinate suspending and reinstating the conversation. First, they need to ensure that Bob's face needs are adequately respected. This follows from the fact that in putting Bob on hold, Ann incurs a debt towards him, a debt that is symbolically repaid by Ann's acts of politeness (as expressed by her asking permission and apologizing). Also, Ann and Bob need to coordinate the topic reinstatement. This is accomplished by Ann's invitation that Bob continue, and Bob's subsequent reformulation of the utterance he was producing when interrupted. These two issues of managing face threat and managing topic reinstatement follow from the properties of joint commitments described above.

At the same time, the question arises whether variations in the situation might lead participants to coordinate these issues differently than in Excerpt 1. A variable that may affect both facework and topic reinstatement is the duration of the interruption. Chevalley and Bangerter (in press) found that longer interruptions made topic reinstatement more difficult, leading participants to abandon interrupted topics more often and revert to prior topics. Longer interruptions also led to more politeness in suspending and reinstating. This supports an interpretation of face threat as increasing in direct proportion to the duration of time the partner is kept waiting. Another variable is the conversational role of the target. In Excerpt 1, the target was in the role of listener when the interruption occurred. It is more effortful for a listener to suspend a conversation than a narrator, because listeners have to interrupt the narrator (an additional face threat), while narrators need only self-interrupt (a process similar to suspending conversation; Clark & Wasow, 1998). Also, the conversational role of the target may impact the responsibilities of conversational partners for topic reinstatement. For example, depending on the topic at hand, narrators may have privileged access to topical content (e.g., when narrating a story). They may thus tacitly be held responsible for its continuation. On the other hand, the listener may sometimes support topic reconstruction (e.g., *you were saying...*). Chevalley and Bangerter (in press) found field evidence that listeners were more polite than narrators in suspending, but were not able to test this conjecture in an experimental setting.

6.3 Hypotheses and setup

In this study, we experimentally manipulated the duration of interruptions of telephone conversations as well as the conversational role of the person targeted by the interruption to test their effects on politeness and topic reconstruction at reinstatement. We predicted that duration would affect politeness, such that longer suspensions should lead to more politeness (Hypothesis 1). Moreover, we expected this effect to reveal itself in politeness *at reinstatement*, because at suspension, targets cannot know for how long they will be interrupted. Thus, they should compensate for a longer interruption by more politeness at reinstatement. We also predicted that duration would affect topic reinstatement, such that longer interruptions should lead to more collaborative effort in reinstating the topic, because prior commitments may be abandoned and have to be negotiated anew (Hypothesis 2). We also predicted that conversational role would affect politeness, such that suspensions by listeners would feature more politeness than those by narrators (Hypothesis 3).

It is not a trivial task to study politeness in suspending and reinstating conversations in the laboratory. Politeness is produced as compensation for a debt incurred towards one's partner by keeping them waiting. For participants to perceive that a debt has indeed been incurred, they need to construe the target as being responsible for the interruption. If the experimenter is perceived as the source of the interruption, they may not hold the target responsible for suspending the interaction, and therefore feel less obliged to be polite. Thus, to create seemingly natural interruptions, we used a similar setup as Chevalley and Bangerter (in press), involving a cover story that led targets to believe they were at fault because they did not adequately complete a task that preceded the conversation. This provided a reason for the experimenter to disturb targets and a reason for targets to attribute the cause of disruption to themselves and not to the experimenter. The prior task consisted in writing descriptions of two pictures. During the subsequent conversation, the experimenter entered the target's room on two occasions and pretended that it was impossible to code some answers from the descriptions because the target's descriptions were unclear. He then asked the target to clarify either the spelling of a word or the meaning of a phrase. To answer the experimenter, targets had to suspend their conversation with their partner. We also interrupted the same person twice, once as a listener and once as a narrator, to avoid "cancelling out" face threat. Thus, conversational role was a within-

subjects factor, while duration (short versus long interruptions) was a between-subjects factor.

The conversational task used by Chevalley and Bangerter (in press) consisted of asking participants to talk about a prespecified topic for 12 minutes. It was not well-adapted to manipulation of interruptions according to conversational role, because turns at talk were short. Thus, the floor changed rapidly and it was impossible to time interruptions to correspond to the precise moment the target was speaking or listening. In this study, we adopted a close-call-story paradigm (Chovil, 1989, 1991; Bavelas, Coates, & Johnson, 2000). Participants in a dyadic conversation take turns telling each other a story where something bad (e.g., an accident) almost occurred, but where everything finally turned out all right. Participants are asked to describe the story in detail, and thus this paradigm has the effect of having participants firmly adopt the roles of narrator and listener for several minutes. We asked unacquainted pairs to tell, in turns, a close call story to each other, interrupting the target twice, once as a listener and once as a narrator.

6.4 Method

6.4.1 Design

The design was a 2 X 2 mixed factorial with duration (short vs. long) as a between-subjects factor and conversational role when interrupted (narrator vs. listener) as a within-subjects factor. Thus, for all pairs, the target was interrupted twice during the conversation, once as a narrator and once as a listener (order was counterbalanced). Half the sample was interrupted for a short duration and the other half for a long duration.

Participants. Eighty-four unacquainted native French speakers participated in 42 pairs in exchange for 10 Swiss Francs.

Procedure and materials. Participants arrived in separate rooms to keep them from meeting each other before the study. They filled out consent forms. Then they were instructed about how to complete the first (bogus) task and the subsequent phone conversation task. In the first task, participants wrote a one-page story describing each of two pictures. When they were finished, the experimenter collected the descriptions. Participants were told the descriptions would be coded during their phone conversation, and that they would be informed in case of a problem. This set the stage for the interruption later on.

For the conversation task, participants talked about a close-call event they had experienced. They were given examples of such events and instructed to narrate the event in detail, as if they were talking to a close friend. Participants were invited to converse freely with the narrator when in the listening role. They each recalled such an event before the conversation was initiated. They discussed using USB phones and Voice over Internet Protocol (VoIP) software. We recorded their conversation on a third computer and filmed the target's room with a video camera mounted with a wide angle lens. Participants knew they being recorded but not that they were monitored in real time. After 6 minutes of the first story, the experimenter asked participants to switch narrators, and after 6 minutes of the second story, the experimenter stopped the experiment. Participants were debriefed and asked if they suspected that the interruptions had been staged. None did.

The target (determined randomly) was interrupted twice, once as narrator and once as listener. The interruptions took place about 90 seconds after the beginning of each story. To interrupt the target, the experimenter monitored the conversations, timing his entry into the targets' room to disrupt them while they were either speaking or listening. We manipulated the duration of the suspension by bringing up a problem related to one of the targets' descriptions. In both duration conditions, the experimenter opened the door of the target's room, entered, approached the target and said *excuse me*. For the short interruption, the experimenter then asked the target a *yes/no* question about one of the target's descriptions. For the long interruption, the experimenter asked the target an open-ended question about one of the descriptions. The experimenter acknowledged the targets' explanation, thanked them, and left the room. We pre-tested these procedures to produce interruptions of approximately 10-15 seconds in the short condition and approximately 45 seconds in the long condition.

6.4.2 Data preparation

Recordings were transcribed in full (both primary and secondary conversations) and checked by a third party, using Praat 4.3.01 (Boersma & Weenink, 2007). Onset and offset of simultaneous speech was underlined. Continuing speech was indicated by "--". Disfluencies were also transcribed (e.g., fillers like *uh* or *um*). Comments were inserted in brackets.

6.4.3 Dependent measures

We coded variables related to politeness (Hypotheses 1 and 3) and reinstatement

(Hypothesis 2). All variables involving subjective assessments were coded by two judges for at least two-thirds of the data set. For dichotomous assessments, we report Cohen's kappa as a measure of agreement. For interval-scaled assessments, we report correlation coefficients as a measure of agreement.

Politeness. We followed Brown and Levinson's (1987) definition of politeness acts, their basic feature being an indirect or less than maximally efficient (Grice, 1975) way of requesting suspension. In the current corpus, such acts included *hold on*, interrogative form (*can I ask you to*), *please*, expressions of time (*a sec, a minute*), mitigations (*just*), justifications, thanks, and apologies. For example, Excerpt 1 features the following acts of politeness on Ann's part: *Can you hang on just a minute* (Turn 18; coded as interrogative form, *hang on*, mitigation and expression of time), *thank you* (Turn 20), and *I'm sorry* (Turn 20.4).

We coded for the presence or absence of each type of act for each interruption, both at suspension and reinstatement. Interrater agreement was high for coding presence or absence of each act (Cohen's kappa values between .70 and .94, all $ps < .001$). We then tallied these acts to create an interval-scaled measure of the amount of politeness. We also computed the number of words used for polite acts before and after suspension. Interrater agreement was high, $r(28) = .85, p < .001$.

Reinstatement. We measured verbal effort of reinstatement in three different ways. First, we coded the number of words devoted to *meta-communication*, defined as explicit signalling of problems in reconstructing the topic (e.g., *Where was I?*). By these acts, participants can solicit help from their partner (Goodwin, 1987). By Hypothesis 2, longer interruptions should lead to more meta-communication than shorter interruptions. Interrater agreement was high, $r(28) = .95, p < .001$. Second, we coded how far back in the conversation partners repeated utterances when reinstating (*rank of repeated utterances*). To do this, we segmented and numbered utterances before the interruption. This created a ranking of previous utterances (i.e., the last utterance before the interruption, the second last one, and so on). The higher the rank, the more remote the previous utterance is from the point of interruption. We computed the rank of the utterance partners referred to at topical reinstatement. This measures how far back in the narration the partners have to go to be able to continue their story (and, indirectly, how they abandon current commitments and revert to prior commitments). If partners continued without repeating what they had

previously narrated, then this rank was zero. In Excerpt 1, the rank of repeated utterances is 2, because the utterance reinstating topical talk *So, uh, {pause 1.60 s lipsmack} uh, not, not growing up familiar with here* (Turn 23), repeats the next-to-last utterance before the interruption *And, uh, but grew up in, uh, Iowa on a farm* (Turn 15). Interrater agreement was high ($r = .97, p < .001$). By Hypothesis 2, longer interruptions should increase the rank of repeated utterances. Third, we coded the degree of *verbatim repetition*, defined as the number of consecutive words (at least two) in the first topical utterance at reinstatement that are repetitions of utterances preceding the suspension. Interrater agreement was satisfactory ($r = .71, p < .001$). By Hypothesis 2, longer interruptions should lead to less verbatim repetition, as it is less likely that the verbatim structure of a prior utterance is kept in memory (Altmann & Trafton, 2002).

6.4.4 Manipulation check

We checked whether the manipulation of duration was successful by computing the duration of each suspension, not including steps to suspend and reinstate the primary conversation. This was defined as the interval between the offset of the last word by the target before the suspension of the primary conversation and the onset of the first word by the target reinstating the primary conversation. For example, in Excerpt 1, this duration is defined by the offset of *you* in Turn 20 and the onset of *I'm* in Turn 20.4. As expected, short suspensions ($M = 5.8$ s, $SD = 2.6$ s) were significantly shorter than long suspensions ($M = 34.3$ s, $SD = 10.3$ s), $F(1,40) = 204.6, p < .0001, \eta_p^2 = .84$.

6.5 Results

6.5.1 Politeness (Hypotheses 1 and 3)

Over all 84 interruptions, the most frequent acts of politeness were apologies (88% of interruptions), followed by justifications (87%), *just a second/moment* (48%), *wait* (45%), and mitigations (38%). To test Hypotheses 1 and 3, we ran 2 (Duration: Long vs. Short) X 2 (Role: Narrator vs. Listener) X 2 (Moment: Suspension vs. Reinstatement) mixed ANOVAs on each of the two dependent variables (number of politeness acts and number of words).

There was a significant main effect of role on politeness acts, $F(1,40) = 20.5, p < .001, \eta_p^2 = .34$, as well as a significant main effect of moment, $F(1,40) = 120.8, p < .001, \eta_p^2 = .75$, and a marginally significant interaction between role and moment, $F(1,40) = 3.17, p = .082$,

$\eta_p^2 = .074$. There was no main effect of duration on politeness, $F(1,40) = 0.005$, *ns*, nor were any other interactions significant. Means are shown in Figure 7. Thus, supporting Hypothesis 3, listeners were more polite than speakers, especially at suspension. Contrary to Hypothesis 1, however, duration did not affect politeness. Interestingly, more politeness acts were produced at suspension than at reinstatement, as indicated by the main effect of moment described above.

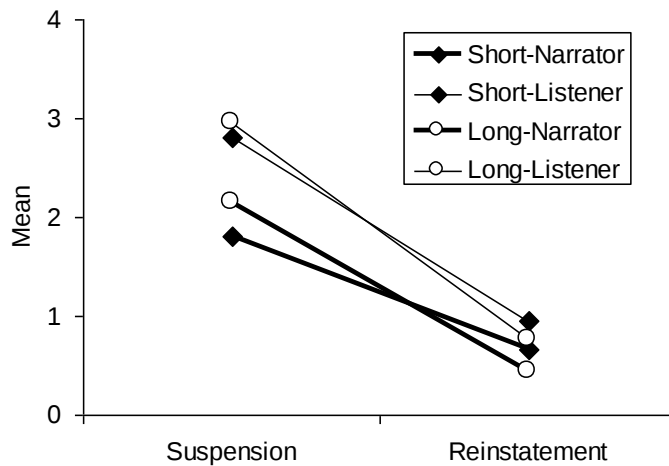


Figure 7. Mean number of politeness acts at suspension and reinstatement for short and long interruptions of narrators and listeners.

Analysis of the number of words devoted to politeness revealed similar results. There was a significant main effect of role on politeness acts, $F(1,40) = 14$, $p = .001$, $\eta_p^2 = .26$. Listener used more words ($M = 24.1$ words, $SD = 17.4$) than narrators ($M = 12.5$ words, $SD = 9.4$). And there was a significant main effect of moment, $F(1,40) = 7.23$, $p = .01$, $\eta_p^2 = .15$. Pairs used more words at suspension ($M = 10.8$, $SD = 6.4$) than at reinstatement ($M = 7.5$, SD). The marginally significant interaction between role and moment reported above was not found, $F(1,40) = .14$, *ns*. There was no main effect of duration on politeness, $F(1,40) = 0.05$, *ns*, nor were any other interactions significant. Thus, again, Hypothesis 3 was supported, but Hypothesis 1 was not.

6.5.2 Reinstatement of the primary conversation (Hypothesis 2)

To test Hypothesis 2, we ran 2 (Duration: Long vs. Short) X 2 (Role: Narrator vs. Listener) ANOVAs on the three dependent variables.

There was a significant main effect of duration on meta-communication (expected according to Hypothesis 2), with more words devoted to meta-communication after long

interruptions ($M = 2.12$ words, $SD = 3.02$) than short ones ($M = .95$ words, $SD = 2.16$), $F(1,40) = 4.93$, $p = .032$, $\eta_p^2 = .11$. There was also an unpredicted marginally significant main effect of role, with more words devoted to meta-communication when narrators were interrupted ($M = 2.14$ words, $SD = 3.07$) than when listeners were ($M = .93$ words, $SD = 2.27$), $F(1,40) = 3.72$, $p = .061$, $\eta_p^2 = .09$. There was no interaction between the two variables.

There was also a significant main effect of duration on the rank of repeated utterances, which was higher for long interruptions ($M = 3.5$ utterances, $SD = 3.5$) than for short ones ($M = 2.1$ utterances, $SD = 1.8$), $F(1,40) = 5.9$, $p = .02$, $\eta_p^2 = .13$. Thus, for longer interruptions, partners repeated utterances from earlier in the narrative than for shorter interruptions. This supports Hypothesis 2. There was no significant effect of role, nor was there an interaction.

Finally, there was a significant main effect of duration on the number of consecutive words repeated (verbatim repetition), with more words repeated for short interruptions ($M = 2.2$ words, $SD = 2.6$) than long ones ($M = 1.2$ words, $SD = 2.1$), $F(1,40) = 5.5$, $p = .024$, $\eta_p^2 = .12$). This supports Hypothesis 2. There was no significant effect of role, nor was there an interaction.

6.6 Discussion

In this study, we explored how variables like duration and conversational role affect politeness and effort to reinstate telephone conversations. We expected (Hypothesis 1) that longer interruptions would lead to more politeness, particularly at reinstatement. We also expected (Hypothesis 2) that longer interruptions would lead to more effort at reinstatement. Finally, we expected (Hypothesis 3) that narrators would be more polite in suspending than listeners.

Results do not support Hypothesis 1. We found no evidence that the duration of the suspension affected the amount of politeness produced. What we did find is that the most frequent politeness acts are apologies and justifications. This corresponds to the nature of the face threat that interruptions pose. We also found that participants were more polite at suspension than at reinstatement. The unexpected absence of an effect of duration on politeness partly contradicts findings from the field study and experiment reported by Chevalley and Bangerter (in press). They found that long interruptions were related to politeness in a field study. In an experiment, they also found that long interruptions led to

more politeness words but not to more politeness acts. The present result may be due to differences in the conversational tasks. Here, participants were interrupted during the narration of close-call stories. These stories are often rather personal and vivid. Participants may have preferred applying politeness at suspension and moving on with the story after the interruption. Another, substantive interpretation of the results is that the differences in duration we studied (under a minute) may have been too small to cause participants to show differential politeness behavior. Chevalley and Bangerter's (in press) proposition that face threat increases in direct proportion to the duration of a suspension may not hold for short durations. Indeed, for short durations, participants may find it more cumbersome to engage in extensive politeness than to simply proceed with reinstating the task. In any case, we recommend further exploration of the relationship between the duration of interruptions and politeness, as this is a central feature of how suspension and reinstatement of collaborative tasks is coordinated.

Results support Hypothesis 2. We found that collaborative effort to reinstate the conversational topic was higher after long interruptions than after short ones. This was shown by more meta-communication, by an earlier point in the narrative to which pairs returned to at reinstatement, and by less verbatim repetition. These results support previous findings by Chevalley and Bangerter (in press), suggesting that for longer interruptions, joint commitments to talk about a particular topic must be renegotiated. This increased effort seems to result from both demands on individual memory (measured by verbatim repetition) and from coordination of common ground (measured here by meta-communication).

Additionally, we unexpectedly found that interruptions of narrators led to more meta-communication, although this effect was marginally significant. It may be that interrupting the narrator is more disruptive for topic reinstatement than interrupting the listener. Interestingly, narrators and listeners recurrently collaborated in reinstating the topic. This can change the course of the narrative, as illustrated by the two following excerpts.

Excerpt 2: Pair 51 (Long interruption of narrator)

- | | | |
|----|----------|---|
| 23 | Narrator | Okay so uh right uh where was I |
| 24 | Listener | Um you were saying that that your father was screaming when uh
when the rescuers tried to put him on the stretcher |

25 Narrator And then afterwards well they put him on the stretcher [continues]

In this Excerpt, in Turn 23, the narrator reinstates the conversation. He exhibits diffluent speech (*so uh right uh*) before explicitly asking the listener for help in reconstructing the topic. The listener obliges in Turn 24 by summarizing the gist of what the narrator had been telling when the experimenter entered the room, whereupon the narrator continues with the story. Thus, listeners have the possibility to influence the way speakers continue by highlighting or glossing a particular aspect through their summaries. In the next excerpt, both listener and narrator contribute parallel versions to the reinstated topic.

Excerpt 3: Pair 11 (Long interruption of narrator)

28 Narrator I resume [laughs]

29 Listener [laughs]

30 Narrator And so they passed where was I they passed themselves off as the police

31 Listener Yeah we were there

32 Narrator Right and then they said we had a –

33 Listener [inaudible] Called his girlfriend

34 Narrator The guy who

35 Listener actually

36 Narrator Right they he called in fact it was three sisters [continues]

Here, in 30, the narrator starts to continue the story, then self-interrupts to ask himself *where was I* before continuing. In 31, the listener answers the narrator's query (*yeah we were there*). The narrator acknowledges this answer (32, *right*) and continues. But the listener offers his own version summarizing the talk before the interruption (33 and 35; *called his girlfriend actually*). Listener and narrator speak simultaneously before the narrator continues with the story in 36. Excerpts 2 and 3 thus illustrate how participants must jointly commit anew to a particular perspective on the narrative. During this process, listeners can become, for a short time, co-narrators of an event they have themselves not witnessed (Goodwin, 1987). These results complement and extend previous findings on the role of listeners as co-narrators (Bavelas, Coates, & Johnson, 2000) by showing that listeners can participate in a more active way than previously demonstrated.

Finally, our results support Hypothesis 3. We found that listeners were more polite in

suspending than narrators. This is because listeners need to interrupt the narrator and take over the floor before proposing the suspension, whereas narrators already have the floor and just need to interrupt themselves. Listeners differed in the strategies by which they took the floor. One strategy is to wait for a potential point of utterance completion, (i.e., a transition-relevance place; Sacks, Schegloff, & Jefferson, 1974), acknowledge the narrator's utterance, and then suggest suspending. This strategy is illustrated in Excerpt 4.

Excerpt 4: Pair 53 (Long interruption of listener)

- 101 Narrator Th- the teacher wasn't there because he said put up the goals then he
went away uh I don't know where
- 102 Listener Oh yeah right. Hold on t- t- two
- 103 Narrator yeah yeah go ahead
- 104 Listener seconds there's she just uh has a question uh

Here, the listener waits till the narrator completes an utterance, acknowledges (*oh yeah right*) and then uses the floor to request suspension (*hold on t- t- two seconds*). A second, less polite strategy is to directly interrupt the narrator, as in the following Excerpt.

Excerpt 5: Pair 3 (Long interruption of listener)

- 65 Narrator there's a road uh paved where cars pass and we know that if we follow
this road we'll come
- 65.1 Listener Sorry but there's
- 65.2 Narrator to the chalet
- 66 Listener I have to interrupt you sorry but here's Sylvie [the experimenter] who's
asking me something wait just
- 67 Narrator Yeah

Here, the listener interrupts the narrator in the middle of an utterance. This strategy is quite disruptive, as suggested by the overlapping speech in 65 and 65.1. It also requires the narrator to engage in extensive politeness. For example, the listener apologizes twice, once for interrupting the narrator, and once before justifying the suspension. Thus, these excerpts illustrate the dilemma of listeners: They can either defer the interruption of the primary conversation to an opportune moment (thus keeping the interrupter waiting) or accommodate the interrupter, which entails directly cutting into the narrator's turn at talk. Part of this predicament is due to the particularities of telephone conversation. Since the physically remote narrator cannot witness the solicitation of the listener by the

experimenter, it is the listener's responsibility as target to alert the narrator. If the narrator, experimenter and listener/target were co-present, interrupting the listener would have probably been easier. Thus, situational aspects may moderate the relation between conversational role and politeness; it seems we have only scratched the surface in exploring these factors.

This study has some limitations. One is the restricted range of the manipulation of interruption duration. As discussed above for the case of politeness, the observed phenomena may change for longer durations. For example, as duration increases, non-targeted participants may themselves engage in other activities. As a result, they may be unable to aid narrators to reconstruct the topic. Or targets may feel obliged to release their partners from waiting on them (e.g., *can I call you back?*). Such large-scale activity-switching behavior is difficult to observe in an experimental setting because it requires breaking the frame that implicitly constrains participants' behavior. Another potential limitation of the study is also linked to its experimental nature. In spite of our cover story, participants may not have attributed as much responsibility for the interruption to the target as they might have in real life. This may have affected their behavior, and highlights the difficulty of manipulating participants' attributions in experimental settings.

Despite these limitations, our study makes an important contribution to the as yet understudied topic of how collaborative activities are suspended and reinstated. The study of collaborative suspension and reinstatement is important because many real-life interruptions concern collaborative tasks. For example, in modern work contexts, the increasing involvement of workers in multiple parallel projects leads to more and more interruptions (Fussell, Kiesler, Setlock, Scupelli, & Weisband, 2004; Gonzalez & Mark, 2005). The micro-processes involved in managing these interruptions are still poorly understood.

Based on our results, we recommend more research on factors related to politeness in collaborative suspensions and reinstatements. Politeness is an important factor in suspending collaborative tasks in work settings because of ubiquitous status differences. Aside from a study in a simulated work setting (Morand, 1996), little is known about how politeness interacts with status differences in managing suspensions. Furthermore, in some organizational situations, interruptions attain a legitimacy that makes politeness unnecessary. For example, the waiter interrupting diners to take their order does not usually apologize for interrupting, because doing so is part of his job. But in many organizations,

situations are not as clear-cut. Understanding when and how participants jointly construe task interruptions as either legitimate or warranting justification could further understanding of many work-related processes, from organizational culture or time management (Perlow, 1999) to stress (Semmer, Jacobshagen, & Meier, 2009).

Based on our results, we also recommend more research on collaborative topic reinstatement. We found that, like individual interruptions, interruptions of collaborative tasks are more effortful when duration increases. But this surface similarity of effects implies some very different processes. In collaborative suspensions, cognitive and interpersonal processes interact. For example, we showed that narrators can enlist listeners' help in topic reconstruction. At a first glance, this could be likened to the effect of a contextual cue that aids goal retrieval (Hodgetts & Jones, 2006b): narrators use listeners as cues to retrieve the topic. But analysis of the actual dialogue reveals that listeners can become co-narrators that actively influence topic reconstruction, especially since they may pursue their own conversational goals that are only partly aligned with narrators' (Russell & Schober, 1999). In general, then, collaborative suspensions add a supplementary degree of complexity to interruption phenomena in individual tasks. Factors that moderate the disruptiveness of interruptions in individual situations (e.g., location in the task, interruption lag) should also be tested in collaborative situations to better understand how participants manage them.

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Chapter 7 – Reinstating interrupted joint activities (Studies 4 and 5)

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7.1 Abstract

People can be interrupted in joint activities. Not much is known about collaborative process when pairs are interrupted. We propose that pairs don't resume tasks, they reinstate them. Pairs need to reconstruct common ground before they continue their tasks. We investigated the process of reinstating joint tasks in two experiments. Pairs of participants performed map tasks without seeing each other. In both experiments, they were interrupted several times, at different moments in the task, and for different durations. Also, in the first experiment, not all participants were distracted during interruptions, and in the second experiment, participants shared their workspace. Our results show that reinstating is a collaborative activity. Pairs were opportunistic and used evidence to continue with the least cost. In particular, collaborative costs were less important when interruptions were short, at the end of sub-tasks, and when pairs could see the state of the task.

7.2 Introduction

How do two people manage to resume a collaborative task after they have been interrupted? We provide an account for the collaborative process of reinstating joint activities. We show how common ground is incrementally reconstructed based on evidence of mutual assumptions of states of joint tasks. Current literature doesn't account for collaborative process in joint task reinstatement. We present evidence of how people reconstruct common ground in two experimental studies.

7.2.1 Interrupting individual activities

Interruptions of activities are commonplace. These interruptions can be beneficial for exchanging information, but also they can cost time, productivity and create errors (Jett & George, 2003; Eyrolle & Cellier, 2000; McFarlane & Latorella, 2002). People can be engrossed in professional activities when they are disrupted by other's solicitations, electronic mail, phone calls, or presence (Gonzales & Mark, 2005; Perlow, 1999). When they are interrupted, people have to transit from their primary activity to secondary activities and later return to their primary activity (Miyata & Norman, 1986; Altmann & Trafton, 2002). These transitions are called interruption and resumption lags. During those, people suspend their goals, change their focus of attention, perform new actions, and later, change their focus of attention and reactivate suspended goals (Miyata & Norman, 1986, Altman & Trafton, 2002; Hodgetts & Jones, 2006a, 2006b). In discourse, individuals can also change their focus of attention on different topics, and later reactivate previous intentions (Grosz & Sidner, 1986, Levelt, 1989). These accounts assume people can retrieve goals that have not been accomplished (Miller, Galanter, & Pribram, 1960). Altmann and Trafton (2002) have proposed a goal activation model which predicts decay of goals over time. Costs of switching activities and reactivating suspended goals apply to individuals involved in joint activities, but these processes alone cannot explain the coordination taking place during interruptions of collaborative activities.

7.2.2 Suspending joint activities

Interruptions of joint activities are commonplace too. People can be interrupted by a third party, when they are interacting with other people. Despite the commonality of such situations, little is known as to how two people cope with interruptions. Interruptions require partners to stop their primary activity, so one of the two can address the interrupting matter (second activity), before they can continue with their activity again. The person who is solicited by the interruption can't merely interrupt and resume the joint activity, alone. Partners who are involved in joint activities need to coordinate their joint actions (Clark, 1996). They need to jointly suspend and later jointly reinstate their activity (Chevalley & Bangerter, in press). Suspension and reinstatement phases are collaborative processes.

Suspending and reinstating joint activities are negotiated by partners (Chevalley &

Bangerter, in press). When partners collaborate together, they commit to a common purpose (Clark, 2006). They do so and expect the same from their partners. They commit jointly. Because of that, their resources are bound. They rely on each other's presence, time and actions to accomplish their common purpose. Partners cannot act and succeed alone. They need to coordinate their joint actions. Partners commit for the purpose of accomplishing joint projects. To do so, they commit to a series of related joint projects. So projects and sub-projects stack up and persist until the joint activity is successfully completed (Clark, 2006).

Suspending joint commitments has collaborative costs (Chevalley & Bangerter, in press; Bangerter, Chevalley & Derouwaux, in press). People's bound resources, persistence and stacking up of joint projects are properties of joint commitments (Clark, 2006). These constraints make joint activities harder to break than individual activities.

When partners need to suspend their joint commitments, they have to solve face and grounding problems.

When partners have to suspend, they need to assess face threat, and possibly redress face. By definition, interruptions happen unexpectedly. They put a time pressure on partners to suspend their current joint commitment. Partners expect equitable treatment in their joint activity (Clark, 1996). They also have negative face and positive face (Brown & Levinson, 1987). They don't like to have their freedom constrained and they don't like to have their self-worth neglected. These two faces are threatened when partners give up their commitments (Clark, 2006). Chevalley and Bangerter (in press) found that partners engage in negative face threat strategies, such as minimizing imposition, apologizing, or providing justifications. These strategies can take place at suspension and reinstatement. Polite acts seem to depend on situational factors. They found that partners were proportionally more polite with longer suspensions, and also, listeners had more trouble initiating suspensions. Listeners were more polite than speakers. This effect of role was also found between listeners and narrators (Bangerter, Chevalley & Derouwaux, in press).

When partners have to suspend, they also need to stop their contributions to joint projects. Then later on, because their joint commitments persisted during interruption, they need to reactivate their stack of joint project and reinstate their common ground (Chevalley & Bangerter, in press; Bangerter et al., in press). In Chevalley and Bangerter (in press), pairs used a great deal of collaborative effort to repeat information that was previously uttered.

Duration of suspension had detrimental effect on the collaborative effort. In the following studies, we aim to find more evidence about the process of reinstatement of joint projects.

7.2.3 Collaborating with joint activities

We argue that reinstating joint activities is a collaborative process. When partners reinstate, they reactivate a stack of joint projects. And then they need to reconstruct common ground to be able to continue with a new relevant contribution. But before we get to the reinstatement process, we need to take a look at how partners negotiate joint projects.

Pairs commit to contribute to a joint purpose. To do that they take part of a series of projects and sub-projects that are nested within each other. These stack up and form an emerging structure. To go through it, pairs move hierarchically and sequentially by entering, negotiating and exiting each project (Clark, 2006; Bangerter & Clark, 2003). Let's look at this example.

A and B make plans to go out and have dinner. First, the two agree to plan a rendez-vous for dinner (level 1 project). To do that, they need to agree on a place and a time to meet (level 1.1). These sub-projects are nested in a lower level. Then for each sub-project, they may have to agree on related parameters, thus creating lower level sub-projects (level 1.1.1). For instance, they may need to agree on the type of cuisine and the places they know about. These lower level-projects are all joint projects that are negotiated by the partners. At this level of the projects, new joint projects can emerge, depending on how partners agree on each contribution. All these projects stack up and persist until partners agree on each of the joint projects at all levels. When partners complete sub-level projects they also fulfill higher up levels. For instance, partners can discuss two different places they know. But once they settle on the place they prefer, this level satisfies the higher level of agreeing on the place. Higher levels of joint projects are more predictable than lower levels. But this depends on the partners' ability to ground their contributions, in other words, how they coordinate the course of their joint actions.

How do partners coordinate the progress of joint projects? They ground their contributions. They collaborate in contributing (Schegloff & Sacks, 1973; Sacks, Schegloff, & Jefferson, 1974), so that each joint action is interpreted as it is meant to be (Clark, 1996). When both know that each knows they have performed a given action, they have

established common ground over the course of actions. Common ground provides evidence they understand each other for the given purpose of their joint project. And with this assumption, they can propose new contributions for their joint projects.

Partners are following the principle of least collaborative effort (Clark & Brennan, 1991). Relevant contributions should be produced in a timely manner and carry enough information so the partners believe current actions are performed (Clark, 1996). This mutual belief, or common ground, depends on evidence that joint actions take place. This depends on joint closure of joint actions (Clark, 1996, see Norman, 1988 for the notion of closure). When partners reach joint closure, they mutually believe “they have succeeded well enough for current purposes” (Clark, 1996, p. 226). This mutual belief about the state of the joint actions is the result of successful grounding. Without joint closure, partners cannot progress in the task and cannot propose a relevant new contribution.

7.2.4 Process of reinstating a joint activity

When partners reinstate, we argue that pairs first need to mutually believe they share joint closure over the course of actions. Then, they can propose a relevant contribution. In cases of suspensions, each partner may have a different belief about the state of their joint project. But partners need to have a common ground to continue. So partners may need to clarify each other’s positions in the joint project.

Let’s look at an example taken from an exchange from our experiments. Here, pairs are collaborating on an adaptation of the map task (Anderson et al., 1991), a goal-oriented task. An instructor explains to a partner, the path of a segment around dots and pictures on a map (see Experiment 1, Method for a detailed description of the procedure):

Excerpt 1 (translated from French)

- 1 I You go down under the word prison
- 2 P M-hm
- 3 I You go back up uh on the point that’s above on the left of prison
- 4 E Stop! [60-second interruption]
- 5 E Resume!
- 6 I Okay so tell me where you are
- 7 P So:
- 8 I Where you are located

- 9 P Uh I'm still under prison
- 10 I Under prison okay. So you are going uh above the point that's on the left of prison
- 11 P Yeah
- 12 I You go...

This exchange refers to the segment in figure 8.

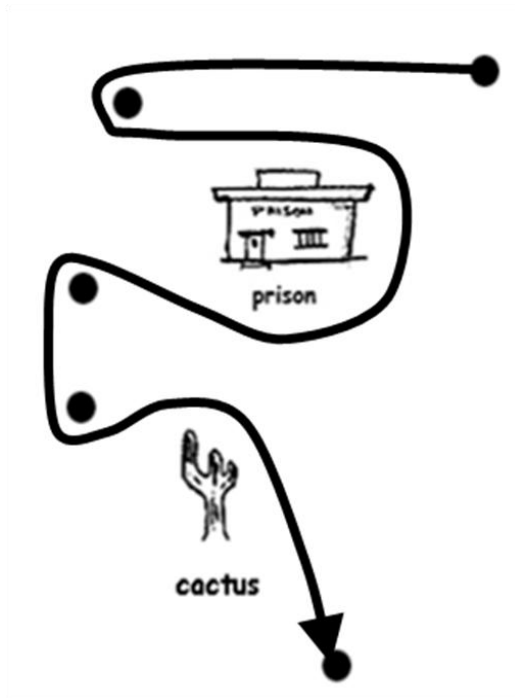


Figure 8. Segment of a map.

In this example, line 1, the instructor proposes a move *You go down under the word prison*, and the partner takes it up *M-hm*, line 2. This is a complete adjacency pair and thus a grounded step. Then, the instructor proposes the next move *You go back up uh on the point that's above on the left of prison*, line 3. He finishes his proposal, but it doesn't get taken up by the partner. They are interrupted by the experimenter who says *Stop!* After 60 seconds of undertaking a secondary task, the experimenter says *Resume!* This signals the pairs to continue with the primary task. Here, the instructor initiates reinstatement, *Okay so tell me where you are*, line 6, which overlaps with the partner's attempt to reinstate *So*, line 7. Then, the instructor repeats his question, line 8. The partner answers *Uh I'm still under prison*, line 9. Then, the instructor acknowledges the partner's position *Under prison okay*. Up to this point what is repeated was already in common ground before the interruption. This

repetition refers to lines 1 and 2. Then the instructor continues and repeats the move at line 3 that did not get construed and mutually understood. He repeats almost the same contribution *So you are going uh above the point that's on the left of prison*. But now, the partner takes it up *Yeah*, line 10, and so it is now mutually understood and belongs now in common ground. In this example, pairs needed several turns to reinstate. They clarified and repeated information that was in common ground prior to the interruption.

As introduced earlier, pairs jointly commit to a series of joint projects and negotiate the course of their actions by grounding each contribution. Joint projects and sub-projects stack up and persist until commitments are fulfilled. In our example, the task can be decomposed into maps, and then paths and segments of paths. In the excerpt, the instructor and the partner negotiate a sub-part of a segment. They are deeply engrossed in their commitments. They have stacked up several levels of commitments. They are negotiating moves around landmarks (drawings and dots). Before the interruption, both agreed to move to a position near a landmark (*Under the word prison* followed by *M-hm*). But then the next move gets disrupted by the experimenter. The partner can't take up the proposal to move above the point. They are in the middle of an adjacency pair, and the first part is left open. At reinstatement, the partner can't take up on the instructor's proposal. This suggests that joint closure is lost. The instructor then tries to figure out where his partner is. The partner indicates he is still positioned where the previous grounded exchange led him to be. The instructor agrees with the partner's position. This creates closure on the completed actions and then provides the opportunity for a relevant new contribution. The reposition to a joint action completed earlier in the task provides the opportunity to repeat the contribution that the partner could not take up earlier. The repetition of the utterance becomes now salient and appropriate, for the current purpose of actions. In previous studies, we found that speakers (Chevalley & Bangerter, in press) and narrators (Bangerter et al., in press) tried to repeat earlier utterances after interruptions.

Joint closure is only given when both partners assume they share the same state of the task and understand which next relevant action needs to be performed. We suggest that when a proposition can't be grounded, it's likely to be repeated. Moreover, if the last action can't be grounded, pairs will likely repeat information in common ground to regain closure on previous actions. We propose the following principle: when partners need closure on previous actions, they will likely revert to earlier actions that are in common ground.

People may repeat previously uttered information when they assume their partner will make sense of it. Speakers prefer to prevent problems of understanding (Clark, 1994), to minimize cost of grounding. Likewise, speakers prefer to restart their utterances than having to repair them with others (Schegloff, Jefferson & Sacks, 1977; Levelt, 1989, Clark & Wasow, 1998). These repetitions can also depend on conceptual pacts pairs have come up with. These pacts set precedents for using referents in the history of joint projects (Brennan & Clark, 1996). They constrain and provide evidence for the process of grounding. We presume this phenomenon should apply to reinstatements of previous contributions.

Available evidence of common ground should help in regaining joint closure. Some evidence comes from the state of the task. At each moment, pairs can refer to the current course of actions and rely on evidence about where they are in the task. Completing sub-tasks provides perceptual evidence about the progress of the task. Evidence can also be provided by utterances. But since speech is evanescent, salience might rapidly decrease. Maintaining closure on speech acts is hard.

Pairs coordinate their actions as they enter into each new joint commitment. These are incremental and hierarchical (Clark, 2006). They stack up and provide evidence of the state of the task. In early commitments, evidence of completion comes from completions of sub-tasks. But as pairs enter in sub-tasks, course of actions become more fine grained and complex. Units of actions become shorter and evolve constantly. At this stage, evidence of the state of the task may be scarce.

Different sets of evidence are available at different moment of completion of a task. For instance, when pairs are in the midst of coordinating a joint action (e.g., a move before drawing a segment of a path), they may take few turns before any action is taken. During these moments, evidence then comes from what the pairs have uttered. But when pairs have completed a task, they have completed related actions (e.g., the end of a path, with visible landmarks and location). Representations of tasks are more salient when tasks are completed (Zacks & Tversky, 2001). In the map task, completions of moves are salient and visible. The path and landmarks are cues of what has been done and what is currently undertaken.

7.2.5 Hypotheses

At reinstatement, joint closure of course of actions should be more given when joint

actions and joint projects are completed, than when joint actions have not yet been taken up. In the latter case, pairs may not remember previous utterances. They might then revert to an earlier state of the task where common ground is assumed.

Similarly, in the task interruption literature, interruptions are more detrimental within tasks than at task boundaries (Hodgetts & Jones, 2006a; Adamczyk & Bailey, 2004; Miyata & Norman, 1986), because fewer suspended goals need to be reactivated. Then, when pairs are interrupted mid-way in a task, there should be more goals to reactivate than at the end of a task. Likewise, pairs should share less evidence about the state of the task at mid-task than at the end of a task. Thus, we hypothesize that reinstatements should be more effortful at mid-task than end-task (Hypothesis 1, Timing).

Common ground is also likely to decay over time. Speech is evanescent and pairs may not remember what they have uttered last or what they have agreed upon. In the task interruption literature, individuals recall less well previous intentions, because activated goals decay over time (Altmann & Trafton, 2002). In Chevalley and Bangerter (in press), pairs continued with new utterances that were locally less relevant after long suspensions (23%), than short ones (59%) and expressed more coordination loss. In another experiment, Bangerter et al. (in press) found similar effects of duration on coordination loss. In that experiment, pairs seemed to revert to earlier utterances in the discussions more often after long interruptions than short ones. Thus, we hypothesize that reinstatements should be more effortful after long interruptions than short ones (Hypothesis 2, Duration).

Now, Timing of interruptions and their Duration may well interact. It might be harder to reinstate at Mid-task and when interruptions last longer, as in Hodgetts and Jones (2006a).

In Bangerter et al. (in press), partners acted as co-narrators when narrators showed trouble to reinstate their stories (Goodwin, 1987). This was particularly the case at reinstatement. Partners acted as placeholders. So, partners who are not distracted during the interruptions might help reconstruct the state of the task. In task interruption literature, cues provide opportunities to prepare for interruptions. They allow participants to rehearse task goals and decrease resumptions lags (Trafton, Altmann, Brock and Mintz, 2003; Hodgetts & Jones, 2006b). Thus, we hypothesize that reinstatement should be more effortful when both participants are distracted than when only one of them is (Hypothesis 3, Target).

Also, sharing a workspace provides evidence of the state of the task and helps

collaboration (Clark & Brennan, 1991; Clark & Krych, 2004). Visual cues and seeing partners provide the advantage of multimodal communication, via actions, gesture and pointing (e.g., Bavelas & Chovil, 2000; Bangerter 2004; Clark & Krych, 2004). When participants share a workspace, evidence of each other's actions should be more prominent. Thus, common ground should be more intact, and reinstatements should be less extensive, than when participants don't share a workspace. In task interruption literature, contextual cues provide opportunities to rehearse and later retrieve goals. When participants can rehearse task goals, resumption lags are shorter (Trafton, Altmann, Brock & Mintz, 2003; Hodgetts & Jones, 2006b). So we predict that visual evidence will help participants figure out the state of the task. Thus, we hypothesize that reinstatement is more effortful when partners cannot see each other, than when they share a workspace (Hypothesis 4, Workspace visibility).

7.3 Experiment 1

We studied the effect of *Timing*, *Duration* and *Target* of interruptions on collaborative effort at reinstatement. We interrupted pairs collaborating on an adaptation of the map task (Anderson et al., 1991). We segmented this task into series of sub-tasks, so we could precisely manipulate the *Timing* and the *Duration* of interruptions. The task was divided into 5 maps and 20 path segments. *Timing*, *Duration* and *Target* were manipulated the following way: Interruptions occurred either in the middle of a segment or at the end of a segment (*Timing*); interruptions lasted either 3 seconds or 30 seconds (*Duration*); and the instructor, or the partner or both participants (*Target*) performed a secondary task during interruptions.

Our design was a 2x2x3 full factorial plan. Two factors, *Timing* (Mid- vs. End-task interruption) and *Duration* (3-second vs. 30-second interruption), were fully crossed and repeated 4 times for each pair of participants. Then another factor, *Target* (instructor, partner or both doing secondary task) was treated in separate groups of pairs.

7.3.1 Method

Participants. Thirty pairs of unacquainted French-speaking students participated in exchange for 10 Swiss francs. They were close in age (age 19-25). There were as many men as women. Participants were randomly assigned to pairs and pairs were randomly assigned to each of the 3 target conditions (10 pairs per condition).

Task. We used the material of the map task (Anderson et al., 1991), and made some

new images. We created 5 maps (A3 size) containing 4 path segments each (see Appendix 1). Each segment started and ended at a black point. Segments followed each other, so that the end point of a first segment was the beginning point of the second segment. Between beginning and end points, segments passed by two drawings and 3 other similar points. No segment looked the same. The segments constituted sub-tasks of the map task, and were explicitly delimited by the points. This allowed us to manipulate the *Timing* of interruptions.

Setting. Pairs of participants sat across from each other at a large table (2 by 1 meter). They were separated by a large screen across the table. This prevented them from seeing each other. Partners had in front of them empty maps and a large pen. Instructors had identical maps except that segments were already drawn. Depending on the *Target* condition, the person who had to perform a secondary task during interruptions had also a printed text on the side of the table and a pen.

Adjacent to the table, behind a large screen, the experimenter monitored the experiment and videotaped the pairs. On the side of the table, two cameras were pointing down on both maps, from a bird's eye view. The two pictures were integrated on a split screen and recorded on digital tapes.

Procedure. Pairs filled out consent forms and were instructed about the task. They were told to collaborate on the task to reproduce identical path segments on their partner's map. They were shown an example of how the segments looked and how they had to complete the task. Then they were told they would be interrupted by the experimenter. They were asked to stop immediately when they heard "stop", and to resume their joint task, when they heard "resume". They were told not to talk to each other during the interruptions. Targets were asked to perform the secondary task as fast as they could. They were told to cross out all instances of the letter "e" in a printed text, with a pen. After the experiment, participants were debriefed about the experiment objectives and questions were answered.

Manipulation of timing and duration. The experimenter monitored utterances to time interruptions. End-task interruptions took place right after pairs agreed they had finished a segment, in other words when they had closed the joint action. Here's an example: The instructor utters: "and that's your end-point, okay?" to which the partner replies: "um yeah, okay". Then the experimenter says: "Stop". Mid-task interruptions took place during a path-segment. Pairs were stopped right at the end of an utterance referring

to the second point near the segment. Here is another example: The instructor utters: “All right and then you go between the water pump and the *point* on the right.” Then the experimenter says: “stop”. So at end-segment, pairs had completed a segment. At mid-segment pairs were in the middle of an ongoing action. In terms of level of actions, End-task interruptions are located at a closed and grounded action at an upper level. Mid-task interruptions are located mid-way through an adjacency pair and therefore in the midst of grounding a joint action. Finally manipulation of *Duration* was straightforward. The experimenter timed the interruption and asked pairs to resume after 3 (Short) or 30 (Long) seconds.

Timing and duration were completely crossed, forming 4 conditions: Mid-task & Long interruptions, Mid-task & Short interruptions, End-task & Long interruptions, End-task & Short interruptions. The 4 conditions were repeated 4 times each, totaling 16 interruptions for each pair of participants. The order of the interruptions was counterbalanced so that 16 segments of the 20 segments would be interrupted as often in each condition. The order was different for each pair.

Measures. We transcribed videotapes word-for-word for each pair, including disfluencies (pauses, auto-corrections and repetitions of syllables). Overlapping speech was underlined, and continuing speech was indicated by “-”. We checked interrater agreements by double-coding 128 cases (27 % of all cases). We computed Cohen's kappa (Fleiss, 1981) coefficients to assess interrater agreement for ordinal variables (acceptance level above > .70). We computed correlation coefficients to assess interrater agreements for numerical variables.

We used the transcriptions for coding 6 measures: number of speaking turns, number of instructions repeated, percentage of grounded steps repeated, percentage of deictic references, percentage of partners initiating reinstatement, and percentage of participants explicitly signaling coordination loss.

First, we computed the number of speaking turns participants used to come up with a new contribution (Interrater agreement: $r(128) = .96$). We deducted the first turn where pairs started reinstating from the turn where a new contribution was made. Typically pairs exchanged utterances to find out where they were in the task and/or repeated instructions. These exchanges measured directly the extent of collaborative effort to reinstate (Clark & Wilkes-Gibbs, 1986; Schober, 1998). We expected pairs to spend more turns at Mid-task and

after long interruptions, and when both of them were distracted during interruptions.

Second, we coded the number of instructions participants repeated (moves and positions) to continue the task (Interrater agreements: $r(128) = .98$ and $.96$, respectively). During the task, pairs spent most turns at identifying landmarks, and then at defining how the path is spatially related to landmarks. This two-step sequence occurred through the whole task. It was similar to the pattern found in Clark and Krych (2004), where pairs first identified a piece and then its position on a Lego construction. We counted each utterance referring to previous steps. The repetitions of instructions measured how many previous actions need to be reinstated to continue the task. This described the effort of reinstating task wise. We expected a pattern similar to speaking turns.

Third, we computed the percentage of interrupted trials for which previously grounded contributions were repeated. A contribution was grounded when it was validated explicitly or tacitly by the other person. Referring to information already in common ground indicated the need to reconstruct joint closure in common ground (Interrater agreement: $\kappa = .70$). By repeating a step already in common ground, a person explicitly refers to a state of the task where joint closure could be assumed. We also expected a pattern similar to previous measures.

Fourth, we computed the percentage of repetitions that included deictic reference. Deictic expressions refer to contextual information. Their meaning cannot be understood without context. They are thus a measure of using shared evidence in common ground. For instance, if someone says *it's broken* to an interlocutor, *it* will refer to an object (e.g., a pen) that the interlocutor can understand, because it is presumably part of the context participants share. Here, we coded cases when a pronoun (*it, this, that, there*) was used to refer to a landmark, or when the landmark was assumed to be known without added contextual information (eg. *the point* only), (Interrater agreement: $\kappa = .73$). We expected partners to use deictic reference more frequently when joint closure was still available, at End-task and after short interruptions.

Fifth, we computed the percentage of times partners initiated reinstatement. We coded who contributed first, instructors or partners, and computed the number of times partners took the floor. In our task, instructors knew the paths and had to instruct their partners. This created an asymmetry among pairs. Of course, participants played a crucial role as well. They indicated they had understood instructions to instructors (Bavelas, 2000).

But generally, instructors initiated moves and identified new goals. When these acts come from partners, it indicates a change of role. This happened in Bangerter et al. (in press) and we suspected this would be the case again in these experiments. Partners offered help by stating where they were or by repeating the instructor's utterance. We expected these initiations more often when both partners were distracted and at End-task and after long interruptions. Interrater agreement was not computed for this variable because no subjective assessment took place.

Finally, we computed the percentage of the times either of the participants explicitly indicated a coordination loss, for instance, "Where were we" or "where are you". The interrater agreement was low: kappa = .55. These utterances signal uncertainties about what is in common ground. It is an explicit measure of loss of closure. It is also a collaborative act, because it requires help from partners (Goodwin, 1987). We were expecting this to happen particularly at Mid-tasks and after long interruptions.

7.3.2 Results

Thirty pairs produced 480 cases of interruptions, 16 per pair (4 conditions repeated 4 times). The 4 repeated scores were averaged at pair level, creating 1 cell for each condition per dependent variable. We then tested all dependent variables with ANOVA. *Timing* and *Duration* were repeated factors, and *Target* sub-samples were treated as between subjects.

As expected, pairs needed more speaking turns to reinstate at Mid-task interruptions than at End-task ones and after longer interruptions than shorter ones (Hypotheses 1 and 2). There was a significant main effect of *Timing*, $F(1,27) = 24.5$, $p < .001$, a significant main effect of *Duration*, $F(1, 27) = 39.1$, $p > .001$, and a significant interaction between the two, $F(1,27) = 7.9$, $p > .01$. Means are presented in Table 4. Pairs used twice as many turns at Mid-task than at End-task, and twice as many turns after 30-second interruptions than after 3-second ones. These results indicate that the effort to reinstate is more important when pairs are in the midst of negotiating a sub-task than when a sub-task is closed, and more so when interruptions last longer.

Table 4. Mean no. of turns (*SD*) to reinstate as a function of *Duration* and *Timing*.

	Timing	
	Mid-task	End-task
Duration		
Long (30 s)	2.9 (0.4)	1.2 (0.2)
Short (3 s)	1.4 (0.2)	0.5 (0.1)

Timing and *Duration* affected the mean number of repeated instructions in a similar way, consistent with Hypotheses 1 and 2. There was a significant main effect of *Timing*, $F(1,27) = 67.4$, $p < .0001$, a significant main effect of *Duration*, $F(1,27) = 42.8$, $p < .0001$, and a significant interaction between the two, $F(1,27) = 12.4$, $p < .01$. Means are presented in Table 5. Pairs repeated three times more repetitions at Mid-task than at End-task, and twice as many repetitions after 30-second interruptions than after 3-second ones. These results indicate that pairs spend time repeating topical information as a strategy to reconstruct common ground. They do that more often when they are in the midst of negotiating a sub-task than when a sub-task is closed, and more so when interruptions last longer.

Table 5. Mean no. of instructions repeated (*SD*) to reinstate as a function of *Timing* and *Duration*.

	Timing	
	Mid-task	End-task
Duration		
Long (30 s)	2.4 (0.2)	0.9 (0.1)
Short (3 s)	1.3 (0.1)	0.5 (0.1)

An additional interaction between *Duration* and *Target* was significant. More instructions were repeated after long interruptions ($M = 2.1$, $SD = 0.23$) than after short ones ($M = 0.9$, $SD = 0.13$) when both participants were distracted, and likewise when instructors were distracted (Long ($M = 1.4$, $SD = 0.24$) vs. Short ($M = 0.7$, $SD = 0.14$)), but not when partners were distracted (Long ($M = 1.4$, $SD = 0.22$) vs. Short ($M = 1.1$, $SD = 0.12$)), $F(1,27) = 5.5$, $p = .01$ (See Figure 9). Following Hypothesis 3, this result suggests that reinstatement is more effortful for both partners than one. It was harder for pairs to reinstate when instructors were distracted rather than when partners were. Instructors led exchanges and

proposed new goals. They anticipated and coordinated each move, based on evidence of partners' progress. One could assume then that they were more likely to lose joint closure than their partners. When partners were distracted, instructors could focus on the course of action and their task goals didn't decay (Hypothesis 3).

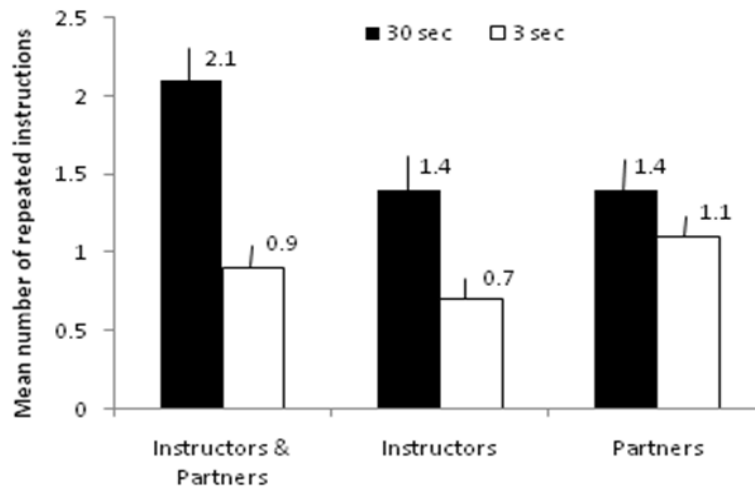


Figure 9. Mean number of repeated instructions as a function of *Target* roles and *Duration*.

Duration affected the repetition of previously grounded information, according to Hypothesis 2. Pairs repeated grounded information more often after 30-second interruptions ($M = 74\%$, $SD = 4\%$) than after 3-second interruptions ($M = 50\%$, $SD = 4\%$), $F(1,27) = 31.7$, $p < .0001$. There was no main effect of *Timing*, or any interactions. This indicates joint closure about the state of the task decay and needs to be reactivated more frequently after long suspensions.

Timing influenced the use of deictic reference, according to Hypothesis 1. Deixis was used more often at End-task interruptions ($M = 31\%$, $SD = 5\%$) than at Mid-task interruptions ($M = 7\%$, $SD = 2\%$), $F(1,27) = 22.3$, $p < .0001$. There was no main effect of *Duration*, nor any interactions. This indicates that at End-task, participants were more confident that information was in common ground.

Timing and *Duration* affected signals of coordination loss (e.g., "where were we?") according to Hypotheses 1 and 2. There was a main effect for *Duration*. Coordination loss was more frequently ($M = 10\%$, $SD = 2\%$) after 30-second interruptions than after 3-second interruptions ($M = 2\%$, $SD = 0.1\%$), $F(1,27) = 14.0$, $p = .001$. An interaction between *Timing* and *Duration* showed a higher frequency for the Mid-Long interruptions ($M = 14\%$, $SD = 4\%$),

compared to End-Long ones ($M = 5\%$, $SD = 2\%$), and both short locations (End-Short & Mid-Short, both $M = 2\%$, $SD = 1\%$), $F(1,27) = 5.1$, $p < .05$. This indicates an added effect of *Timing* over *Duration*. Long interruptions are more detrimental to joint closure about the state of the task, and even more so when interruptions occur in the middle of an ongoing task.

7.3.3 Discussion

Results provided support for all hypotheses. We hypothesized that Mid-task interruptions were more costly to reinstate, than End-task ones (Hypothesis 1). Indeed, pairs needed more turns and repeated more information when they were in the middle of joint actions (Mid-task), then where they had closed joint actions (End-task). They also signaled more problems to continue after a Mid-task interruption when it was long. They relied more on common ground at End-task than at Mid-task. Pairs repeated more grounded information at End-task than Mid-task. This was unexpected. Reverting to an earlier step seems to be a cost-efficient strategy for pairs to continue the task. Similarly to Clark (1994), participants opted for preventing rather than repairing. Participants didn't take the risk of assuming information was in common ground. This seems to apply in particular at the end of the task. By referring to the end-point to continue the new task, instructors reactivate joint closure over the past joint actions. Pairs seem to use any evidence to maintain common ground accuracy.

We hypothesized that long (30-second) interruptions were more costly to reinstate than short (3-second) interruptions (Hypothesis 2). Again, pairs needed more turns, repeated more instructions, referred more frequently to information common ground, and signaled more often loss of coordination after 30-second interruptions than 3-second ones. This suggests that joint closure is still active in partners' mind after brief interruptions. Partners can rely more on mutual assumptions during short distractions and try to continue with minimal adjustments.

Interactions between *Timing* and *Duration* showed cumulative effects for the collaborative cost. By far, the most difficult condition was interruptions taking place at Mid-task and for 30 seconds. There, pairs were in the midst of grounding a joint action in a sub-task. Lasting interruptions seemingly challenged pairs' unreliable common ground. Then, the easiest conditions were End-task interruptions. *Duration* seemingly had less effect at that location of the task. We suggest that more obvious evidence about common ground might

compensate for the possible decay of the state of the task and its goals.

Lastly, only one result supported the assumption of more collaborative costs when both partners were distracted than only one (Hypothesis 3). Distracting both participants, or the instructors, increased the effort to repeat previous information, but only when interruptions lasted 30 seconds. The collaborative effort did not seem to be influenced by the target of the interruptions. This suggests that possible asymmetries among participant don't account for the need to reconstruct common ground. Because partners need to reconstruct a common ground to continue, the effort remains collaborative, whether partners or the instructors are distracted.

Our results show that reinstating a joint task requires collaborative acts. The manipulation of *Duration* provided contrasting results. The decay of the state of the task seemed critical for pairs to continue with a lesser cost. Likewise, the manipulation of *Timing* of interruptions provided contrasting results. Common ground at Mid-task was more difficult to reconstruct than End-task.

7.4 Experiment 2

The goal of our second experiment was to further test Hypotheses 1 and 2 and combine these effects with another contextual parameter. To do that, we manipulated the kind of evidence pairs could use to reinstate. Instead of interrupting partners or instructors, half the pairs shared workspaces and saw where their partners were in the task (*Workspace visibility*). With this manipulation, we tested Hypothesis 4: Visual evidence should help participants reconstruct the state of the task. Thus, we hypothesize that reinstatement is more effortful when partners cannot see each other than when they can.

Timing of interruptions and Hypothesis 1 remained unchanged, but we increased *Duration* of interruptions, to 30 and 60 seconds. In Chevalley and Bangerter (in press), long interruptions averaged around 35 seconds. These created more cost for reinstating topics of discussions. But it's not clear whether comparatively longer interruptions would increase collaborative costs. Would the relative effect still hold? So, we hypothesize again that with longer durations, reinstatements should still be more effortful after long interruptions (60 seconds) than short ones (30 seconds) (Hypothesis 2).

7.4.1 Method

Three parameters were manipulated in a 2x2x2 factorial design: *Duration* and *Timing*

of interruptions, and *Workspace visibility*. We kept the same 2x2 configuration for *Timing* and *Duration* factors: *Timing* (Mid- vs. End-task) x *Duration* (30-second vs. 60-second), fully crossed and repeated 4 times for each pair. For *Workspace visibility*, half of the sample could not see each other (hidden condition), like in Experiment 1, and the other half could see the partners' map (visible condition). Lastly, we controlled *Target* factor. In all cases, both participants had to perform the secondary task.

We used the same procedure as in Experiment 1. Noteworthy modifications are indicated hereafter.

Participants. Thirty-two (16 in each of the workspace conditions) unacquainted French-speaking pairs of students took part in the experiment.

Task. We created additional orders of interruptions for additional pairs.

Setting. The setting was identical, except for pairs in the visible workspace condition. In the visible condition, the screen (used for the hidden condition) was removed, allowing both partners to see each other. The maps of the experimenter were hidden behind a small screen (H:20 x W:40 cm). So partners could only see the instructors' faces, arms and the top of their chest. However, nothing was blocking the instructors' sight. They could see the partners and their maps.

Procedure and manipulation of timing and duration. The same procedure and manipulation took place, except that short interruptions lasted 30 seconds and long interruptions lasted 60 seconds.

Measures. For the purpose of comparing results with Experiment 1, we coded the same set of variables, on similar transcriptions, and assumed unchanged interrater agreement.

7.4.2 Results

Thirty-two pairs produced 512 cases of interruptions. Repeated scores were averaged at the pair level. We ran the same analyses as in Experiment 1. *Timing* and *Duration* were repeated factors, and *Workspace visibility* was a separate factor.

Again, according to our hypotheses, pairs needed more speaking turns to reinstate at Mid-task interruptions than at End-task ones (Hypothesis 1), and after long interruptions than after short ones (Hypothesis 2), but also in the hidden condition than in the visible one (Hypothesis 4). There were significant main effects of *Timing* ($F(1,30) = 76.1, p < .001$),

Duration ($F(1,30) = 6.7, p < .02$), and *Workspace visibility* ($F(1,30) = 31.5, p < .001$). There was a significant interaction between *Workspace visibility* and *Timing*, $F(1,30) = 14.4, p = .001$, but not for *Workspace visibility* and *Duration* ($p = .09$). Means are reported in Figure 10.

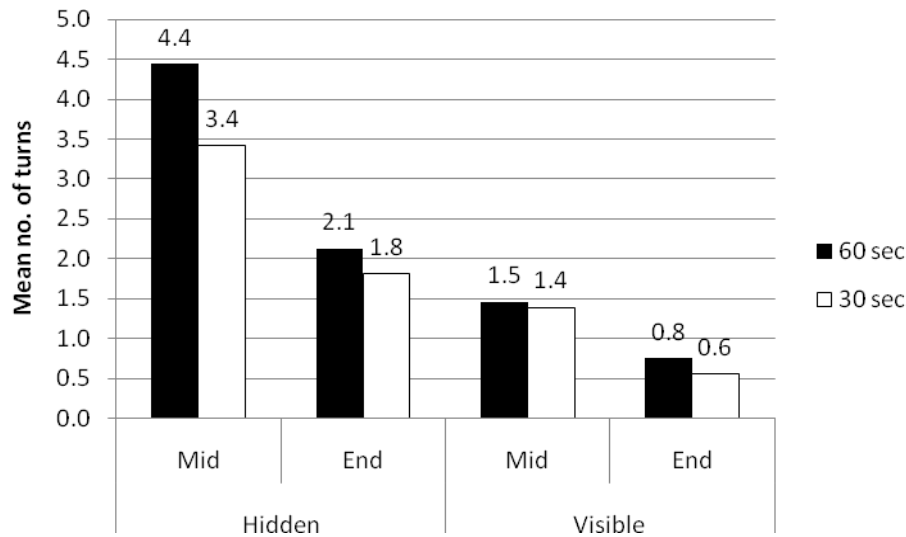


Figure 10. Mean no. of turns to reinstate joint tasks as a function of *Workspace visibility*, *Timing* and *Duration*.

Pairs needed most turns when they were interrupted Mid-task and were in the hidden condition. They needed the least turns in the visible condition. On average, they needed three times more turns in the hidden condition than in the visible one, and twice more turns at Mid-task than at the end. Finally, they needed more turns after 60-second interruptions than 30-second ones. This last effect is smaller than the other two, but is nevertheless significant. We can see the accumulation of constraints of conditions from the right to the left hand side, the hardest condition (Hidden, Mid-task, and Long) standing on the left, and the easiest standing on the right (Visibility, End-task, and Short).

We obtained the same effects for repeated instructions (Hypotheses 1, 2 and 4). There were significant main effects of *Timing*, $F(1,30) = 93.1, p < .0001$, *Workspace visibility*, $F(1,30) = 217.4, p < .0001$, and a marginal effect of *Duration*, $F(1,30) = 3.9, p = .056$. *Workspace visibility* and *Timing* interaction was significant, $F(1,30) = 15.6, p < .0001$. The means are displayed in Figure 11.

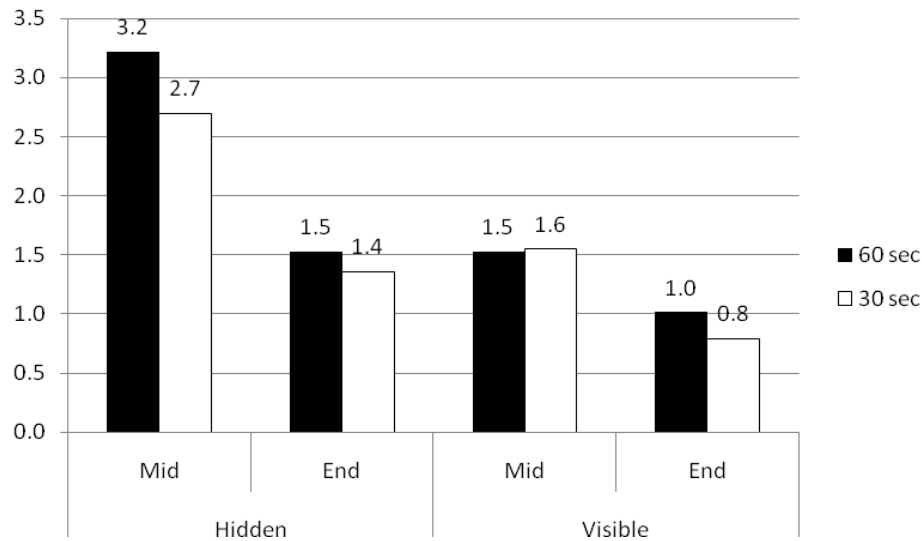


Figure 11. Mean no. of instructions repeated to reinstate joint tasks as a function of *Workspace visibility, Timing and Duration*.

Patterns are similar between repetitions of instructions and speaking turns, though the contrasts are not as important. Pairs repeated more instructions when they were interrupted Mid-task and were in the hidden condition. And they repeated less in the visible condition. On average, they did that twice more often in the hidden condition than in the visible one, and at Mid-task than at End-task. Here again results suggest the collaborative effort to reinstate the joint task accumulates through the conditions as they share less evidence of where they are in the task.

Results for repetition of grounded information produced a mixed outcome. As we predicted in Hypothesis 4, pairs did repeat grounded information more often in the hidden condition ($M = 81\%$, $SD = 22\%$) than in the visible one ($M = 50\%$, $SD = 30\%$), $F(1,30) = 23.2$, $p < .000$. But once again Hypothesis 1 was not supported. *Timing* produced a significant result but opposite to the hypothesis. Pairs did not repeat more often at Mid-tasks ($M = 57\%$, $SD = 26\%$), but rather at End-tasks ($M = 74\%$, $SD = 26\%$), $F(1,30) = 16.6$, $p < .001$. Also, the *Duration* manipulation did not produce significant differences for this variable (Hypothesis 2) either. Nevertheless, *Workspace visibility* and *Timing* produce a significant interaction, $F(1,30) = 7.5$, $p = .01$. Means are showed in Table 6.

Table 6. Mean percentage of repetition of grounded steps (*SD*) to reinstate as a function of *Workspace visibility* and *Timing*.

	Location	
	Mid-task	End-task
Workspace visibility		
Hidden	72 (26)	90 (19)
Visible	42 (25)	58 (34)

These results indicate that pairs needed to reconstruct common ground when they were lacking visual cues. The lowest mean score (42%) is in the visible condition. However, this is a relatively high “baseline” frequency. This suggests that to reinstate tasks, pairs often need to actively reconstruct common ground, in spite of the available evidence about the state of the task.

Timing and *Workspace visibility* also affected the use of deixis. There was a main effect for *Workspace visibility* ($F(1,30) = 13.7, p < .0001$), and a significant interaction between *Workspace visibility* and *Timing* ($F(1,30) = 7.0, p < .02$). See Table 7 for means. The *Duration* effect was non-significant ($p = .075$), though in each cell, there was slightly more deictic use after 30-second than 60-second interruptions. In the visible condition, pairs often used deictic reference irrespective of whether interruptions were at End- or at Mid-task. But then in the hidden condition, the use of deixis dropped considerably, and particularly at Mid-task. Here, we see the advantage of shared evidence. At End-task, pairs shared a landmark, the end point, and they referred to it frequently to coordinate their next move. But at Mid-task such a placeholder was lacking.

Table 7. Mean percentage of deictic reference (*SD*) to reinstate as a function of *Workspace visibility* and *Timing*.

	Location	
	Mid-task	End-task
Workspace visibility		
Hidden	14 (17)	34 (32)
Visible	49 (27)	45 (31)

Timing also affected loss of coordination. There were more explicit utterances

expressing loss at Mid-task ($M = 17\%$, $SD = 21\%$) than at End-task ($M = 0.6\%$, $SD = 13\%$), $F(1,30) = 13.8$, $p = .001$). No effect was found for *Workspace visibility*, nor for *Duration*. Again, lack of evidence of last utterances before interruptions at Mid-task prevents accurate representations of states of the task. So when in trouble, interlocutors explicitly ask for help.

7.4.3 Discussion

Results replicated findings of our first experiment and provided further support for our hypotheses. According to Hypothesis 1, it was more costly for pairs to reinstate at Mid-task interruptions than at End-task interruptions (*Timing*). Pairs needed more turns, repeated more information, and signaled more problems in midst of a course of joint actions (Mid-task), than at the end of a sub-task (End-task). But contrary to our expectations, participants repeated information in common ground more often at End-task rather than at Mid-task. Also they did not use deictic reference differently at End-task or Mid-task. These unexpected results suggest that reverting to a point in common ground or referring to information in common ground is a cost-efficient strategy independently of the task state. It prevents costly repair afterwards if mutual assumption of common ground was wrong.

The *Duration* manipulation provided limited support for Hypothesis 2. There was one significant effect with speaking turns, and a marginal one with the repetition of instructions. All the other variables did not vary significantly. Scores were often higher in the 60-second conditions than in the 30-second one. But differences were too small to produce significant differences. These results suggest an added effect of duration over *Timing* and *Workspace visibility*. The lack of interaction with *Workspace visibility* and *Timing*, also indicates that loss of goals in memory were not compensated by visual evidence or by easier location in the task (End-task).

According to Hypothesis 4, pairs needed more turns, repeated more instructions, repeated more often grounded information, and use less deictic reference when the workspace was hidden than when it was visible (*Workspace visibility*). Pairs did not signal fewer loss of coordination in the visible condition. This could indicate that despite visible evidence, participants, mostly instructors, needed to be explicit about their intent to reinstate the task. For instance, when instructors utter “so where are you”, while looking at the partners’ map, they signal collaborative intentions.

The interactions between *Workspace visibility* and *Timing* suggest that pairs use a

cost-efficient approach to reinstate. Pairs seem to be opportunistic about the use of evidence to assess common ground accuracy. Collaborative effort differences between Mid- and End-task were small in the visible condition, but were larger in the hidden condition. In the visible condition, visual evidence of the state of the task may compensate for the lack of verbal evidence at Mid-task, and even out the advantage of End-task evidences (the end point). In contrast, in the hidden condition, only utterances provided evidence. In this condition, the End-task positions provided a more confident state of the task than Mid-task ones.

The above results show again that reinstating a joint task requires collaborative acts. This time, longer duration didn't affect as much memory loss about task goals. Instead, visibility of the workspace provided a dramatic advantage to the process of collaborative reinstatement. Moreover, this advantage was more pronounced at End-task than Mid-task. The accumulation of evidence seems crucial for the pair to regain joint closure and reconstruct common ground.

7.4.4 Comparison of Experiment 1 and 2

A comparison of the two experiments is revealing of influences on collaborative effort at reinstatement. In Experiment 1, *Timing* effects interacted significantly with *Duration* effects. But in our second Experiment, this wasn't the case anymore. Instead *Timing* effects interacted significantly with *Visibility* effects. *Duration* effects were significant for speaking turns only. Let's look at the number of speaking turns in all the conditions (see Figure 5).

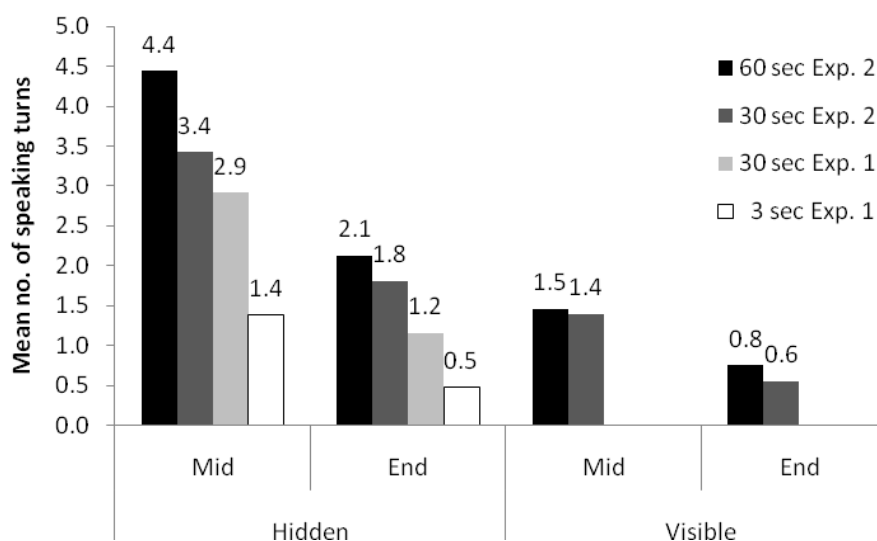


Figure 12. No of speaking turns as a function of *Duration*, *Timing* and *Workspace visibility* from Experiment 1 and 2.

Overall, we can see the added constraints from our manipulations on the effort to reinstate. Hidden workspace, Mid-task interruptions, and longer interruptions increased turns to reinstate the joint task. But further observations can be made. Consider the Duration score in the hidden conditions. There, we can see pairs needed less turns as duration decreased. Relatively speaking, duration mattered in each of the Timing conditions. But then, the *Timing* of the interruptions had a significant impact on the collaborative effort, irrespective of the durations of interruptions. The same contrast can be made between visible and hidden workspaces with the *Timing* of interruptions. There is no doubt that visibility decreased the effort both Mid- and End-task.

It is worth noting that at End-task, 3-second interruptions cost the same amount of turns in the hidden condition (0.5 turns), than the 30-second (0.6 turns) or 60-second (0.8 turns) interruptions in the visible condition. The same similarity appears at Mid-task. Three-second interruptions cost the same amount of turns (1.4) in the hidden condition, than 30-second (1.4) or (1.5) 60-second interruptions in the visible condition. This suggests that decay of goals was compensated by visibility of the state of the task. This compensation doesn't hold for longer interruptions in the hidden condition. Hidden constraints added up and overcame duration differences.

7.5 General discussion

Reinstating a joint activity requires a collaborative effort. It was more effortful for pairs to reinstate at Mid-task, rather than at End-task. It was more effortful when pairs didn't see each other, than when they did. And it was more effortful and after 30- and 60-second interruptions, than after 3-second interruptions. These results support our main hypotheses.

Both results suggest that *Timing* of interruptions predominantly influenced the effort of reinstating joint tasks. The moment of interruption is absolutely constraining. It affects the state of the task and thus the related evidence pairs can rely on to reconstruct common ground. But then our results indicate two other conditions where participants regain joint closure faster. *Workspace visibility* provides the opportunity to gather visible evidence of the task. And short *Duration* of interruptions prevents decay of task goals. In our experiments, 3-

second interruptions were as advantageous as seeing workspace with longer interruptions. Keeping common ground active relates to time and can be compensated with visible evidence. Similarly to other findings (Adamczyk & Bailey, 2004; Altmann & Trafton, 2002; Clark & Krych, 2004; Hodgetts & Jones 2006a, 2006b), our results show advantages of visual cues, of short interruptions, and of End-task interruptions on collaborative effort at reinstatement.

Participants didn't merely resume their activities. They needed to reinstate common ground, so they could continue their tasks. We proposed that when partners lose common ground on their last actions, they would revert to earlier actions to attain joint closure. We also suggested that available evidence of the task state helps that process. Our findings support this account. Pairs' actions were opportunistic. They tried to minimize the cost of reinstating common ground. When interruptions were brief or when they could see their partners' map, they referred to information in common ground half the time and didn't need to repeat more information. When they lost joint closure, they relied on shared evidence of the state of the task. Pairs rarely took the risk to assume information was in common ground, when they had no evidence it was the case. They opted for preventing rather than repairing errors of understanding (Clark, 1994; Clark & Wasow, 1998). These strategies are collaborative acts. They facilitate joint closure and consequently create conditions for new relevant contributions. Brennan and Clark (1996) have proposed that earlier pacts serve as evidence and constraints to continue the task. In essence, common ground is an up-to-date accumulation of mutual understanding. When pairs need to resume joint actions, they will rely on what pairs have accomplished and have in common ground to find out how to continue.

More research is needed to find out about the effect of duration on the need to reconstruct common ground. Our results show that participants are minimizing their effort to reinstate. When interruptions last 3 seconds or when participants are reinstating at the end of a task, participants refer to common ground using more deixis. They assume common ground is intact. When interruptions last longer, they tend to repeat information that was already in common ground. So it would be interesting to find out the maximum duration for which participants can afford not to refer to common ground to continue. This duration is probably very brief (under 3 seconds). Then, it would be interesting to know the maximum duration for which participants can afford to refer to common ground, without repeating

information that was already shared. This duration should be also brief (a few seconds?). Then, it would be interesting to know the maximum duration for which participants can afford to repeat information that was already shared, without having to repeat previous steps in the joint project. This duration should be less than a minute. Then, we could imagine that with longer durations, participants would have to agree on reinstating more goals in the stack.

Also, it would be interesting to replicate these findings with another structured goal-oriented task, but one that relies on verbal evidence only. In other words, participants would be involved in a dialogue to solve a given problem, and would not have visual evidence about the progress of their task. The effort to reinstate should be more important, than when participants share visual evidence. Also, participants may help each other more if both know they are lacking evidence about where they are in their task.

Also, the cost of reinstatement could be more important when participants are not co-present. In Chevalley and Bangerter (in press), we found that participants needed to restore commitment before continuing their joint project. In this step, joint attention was also achieved. But it's not clear how this would happen when participants don't need to address face loss. In an experiment where participants would know they would be interrupted, face threat issues would be controlled. So we could observe the phenomenon of reinstating joint attention and joint projects only. It's possible that participants keep reinstatement effort to a minimum when they re-establish contact.

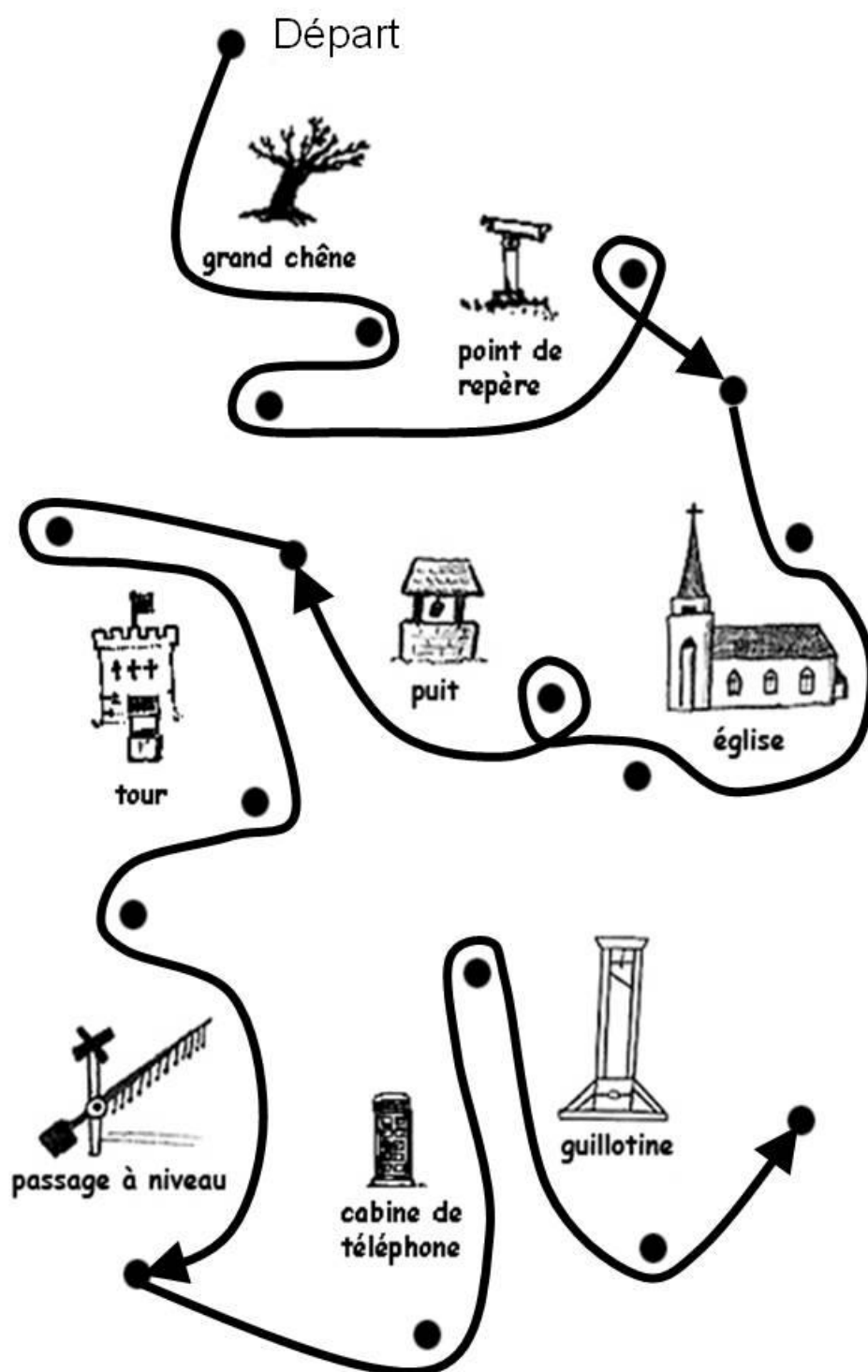
Interruptions in joint activities create collaborative costs. More research is needed to understand how people deal with costs of interruptions, and reinstate common ground.

Acknowledgments

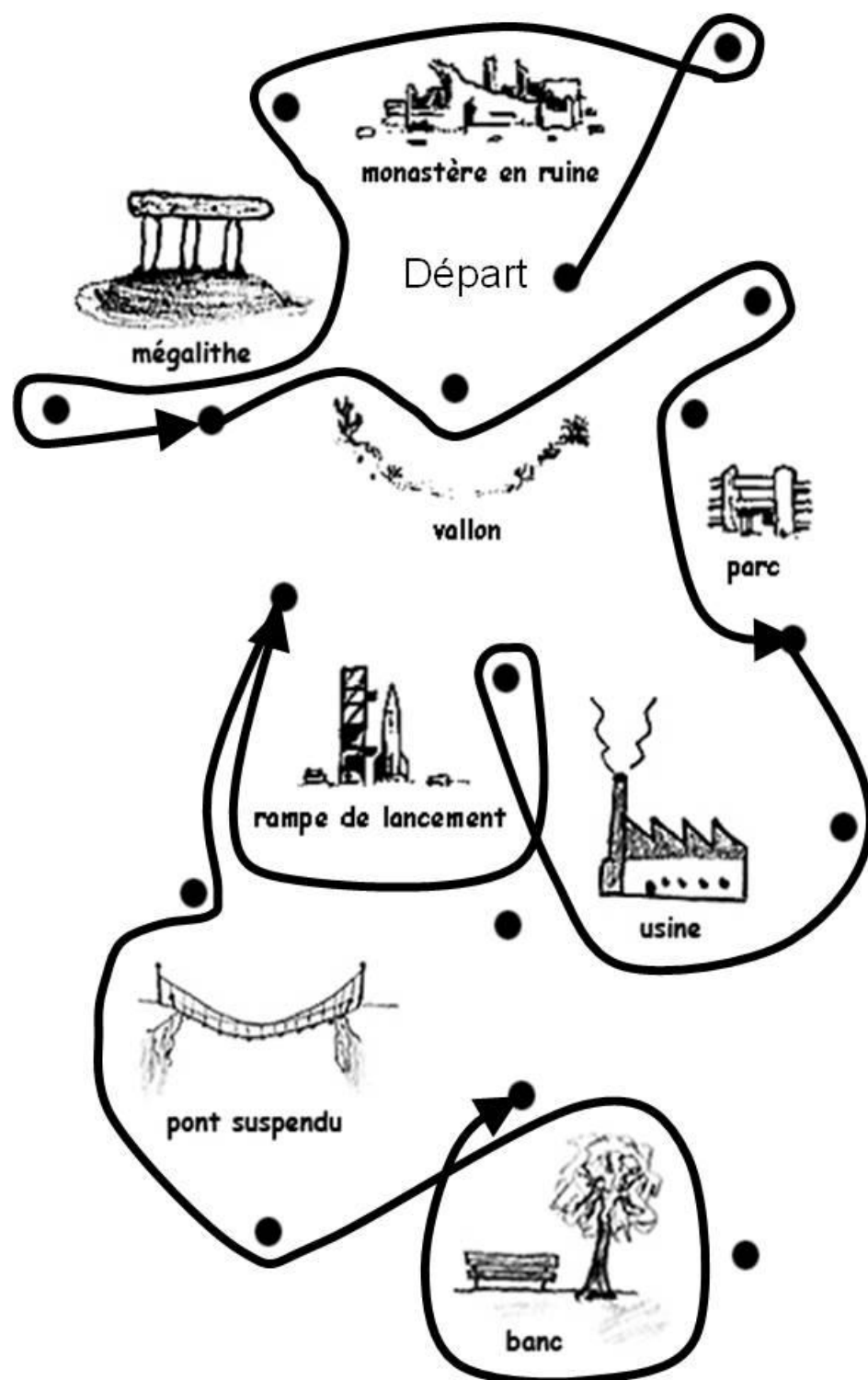
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Appendix

Map 1

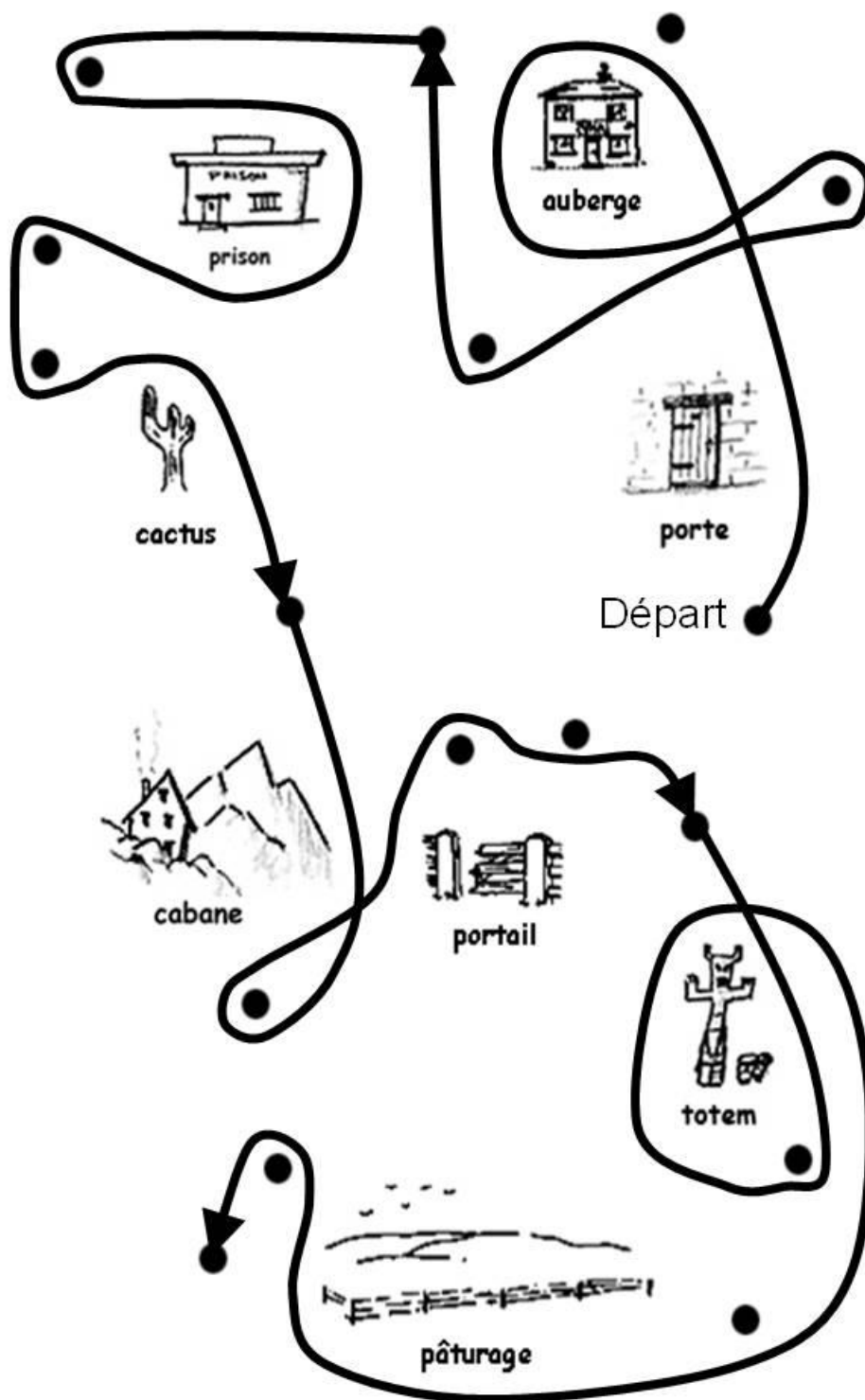


Map 2



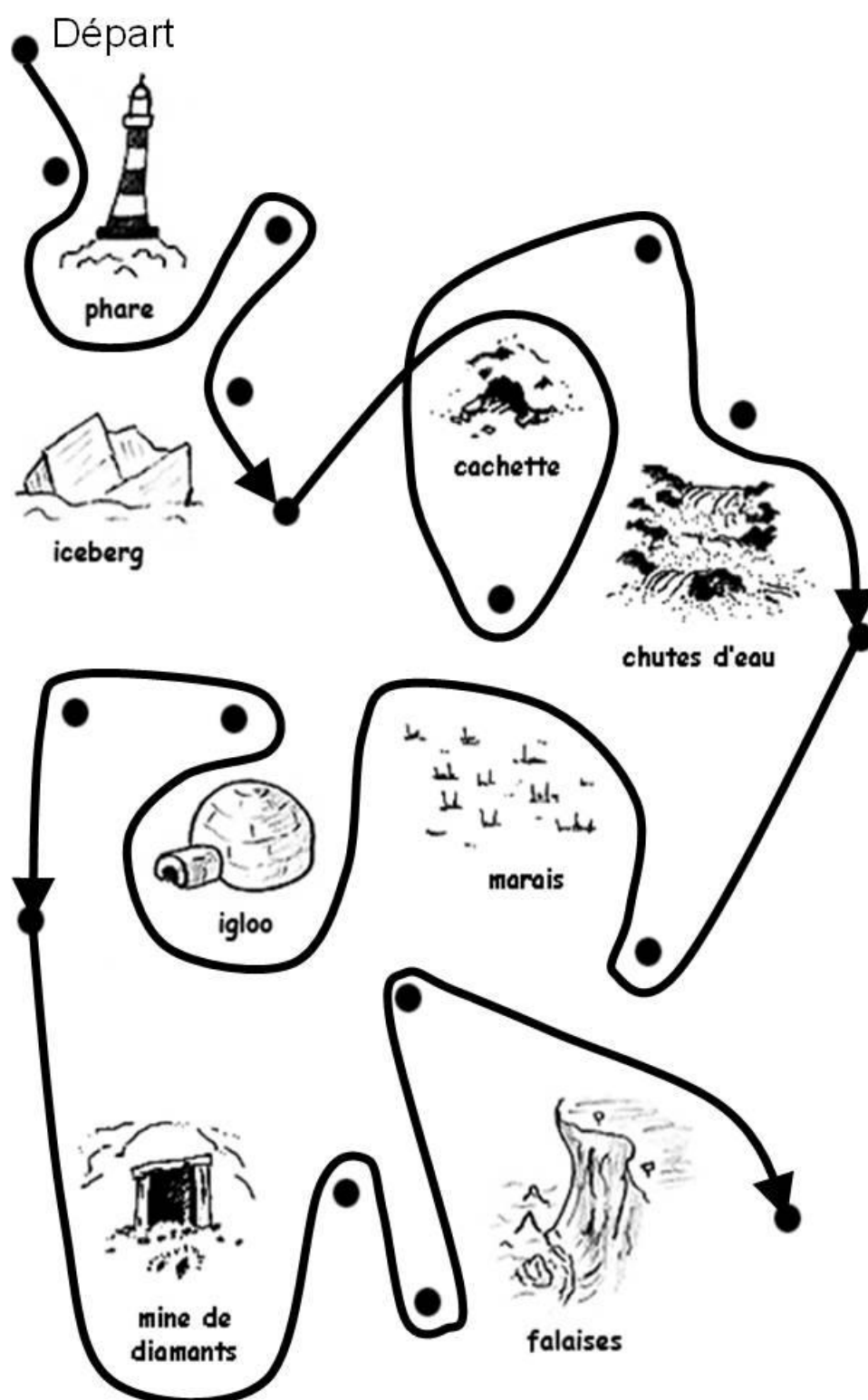
2

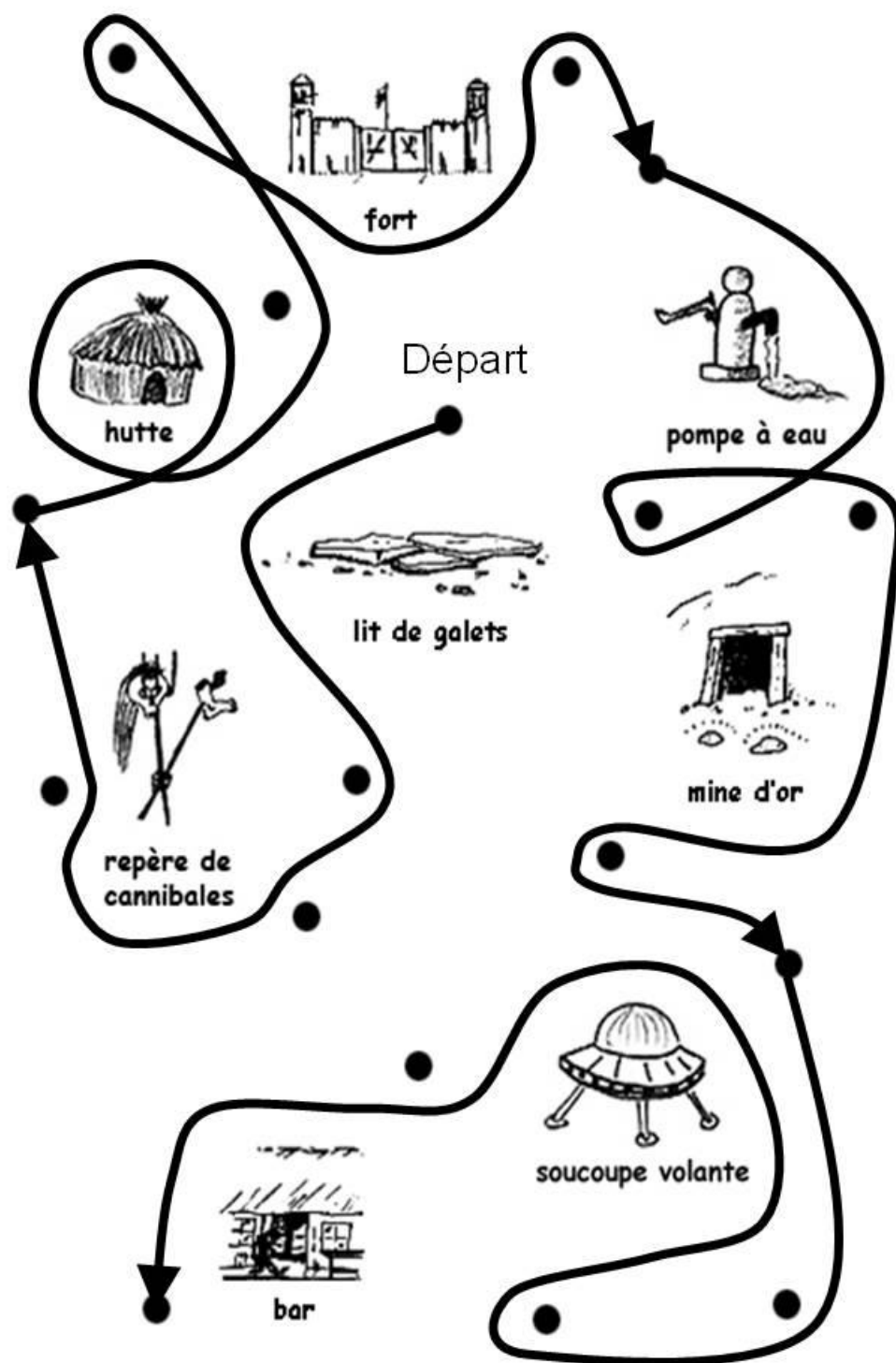
Map 3



3

Map 4





Chapter 8 – General discussion

In this discussion, I present a brief summary of the results, draw some implications, review our model of suspensions, address the limitations of the studies, and finally propose some leads for further studies.

8.1 Summary of results

In Study 1, we started by proposing a process model for suspensions, based on properties of joint commitments. Suspensions have three phases: suspending a joint project, dealing with interruption, and reinstating a joint project. Because suspensions create impositions and threaten people's face, we expected a sub-step of facework to occur at suspension and reinstatement. Qualitative observations in naturally-occurring suspensions in phone conversations indicated that duration of interruptions and conversational roles influenced the collaborative cost of coordinating suspensions. In quantitative analyses, we measured the effect of the duration of an interruption and the effect of the conversational role (speaker or addressee) on facework and topic reinstatement. Results showed that longer suspensions increased facework and the effort to reinstate the conversation. Also, addressees were more polite than speakers.

In Study 2, we set up an experiment where participants engaged in phone conversations and were interrupted with a cover story. We replicated results of Study 1. Participants were more polite and spent more time reinstating their conversations when suspensions were long ($M = 35$ sec) than short ($M = 12$ sec). But we couldn't test the effect of conversational role, due to unpredictable changes of floor between participants when interruptions occurred.

In Study 3, we used a similar experimental setting, and we controlled conversational roles by asking participants to narrate close-call stories to their partners. There, again, participants spent more time reinstating conversational topics after long suspensions ($M = 34$ sec vs. $M = 6$ sec), but contrary to our expectations, participants were not more polite. Instead, they were more polite as addressees rather than narrators. They were more polite at suspensions than at reinstatements. Addressees waited for appropriate times to initiate suspensions (when they could take the floor), and then quickly handed the floor back to narrators.

In Study 4, we focused on the reinstatement process in a goal oriented-task. We

measured the effects of duration and timing of interruptions, and the effects of distraction of participants during secondary tasks, in an experiment where participants could not see each other. Participants spent more time reinstating their task after long (30sec) interruptions, than after short (3sec). Likewise, participants spent more time reinstating when they were interrupted Mid-task rather than End-task. They also referred to information in common ground as often at Mid-task than at End-task. Interactions of timing and duration factors also indicated cumulative effects for reinstating tasks. Lastly, distractions of both participants during interruptions did not show consistent effect on reinstatement.

In Study 5, we used same the design as in Study 4. We increased durations of interruptions and allowed half of the participants to share their workspace. This time, results showed partial support for the effect of duration. However, participants used more turns to reinstate after long (60sec) than short (30sec) interruptions. Moreover, participants spent more time reinstating at Mid-task than End task again. This effect was significant only when workspace was shared (interactions between timing and workspace visibility). Comparisons with previous studies also suggest cumulative effects of duration and timing of interruptions and workspace visibility on the effort to reinstate.

8.2 Implications

Let's go back to our model of suspension and review it in light of our findings. Suspending a joint activity is a collaborative process. When one or both partners are interrupted by a third party, they usually can't afford to continue their joint activity, because, at least, one of the partners needs to deal with the interrupting matter. Joint activities involve the coordination of mutual actions. So they need to jointly suspend and later, jointly reinstate their activity. Suspensions have collaborative phases and costs.

First, suspensions have three phases: suspending a joint project, dealing with an interruption, and reinstating a joint project. At the project level, these phases are similar to the Entry-Body-Exit phases of joint projects (Clark, 1996), except that participants agree on an Exit first, and then on an Entry. Each of these steps has Entry-Body-Exit phases as well, because they also need to be negotiated. Participants need to agree on suspending and then agree on reinstating their joint project.

Second, suspensions have collaborative costs. When partners are involved in joint

projects, they commit to them. They bind their resources to achieve a common purpose. They expect their partners to do the same. Their commitments unfold in a series of joint projects and sub-projects. So when they have to part unexpectedly and momentarily, they deal with a potential face threat, and with the risk of losing common ground.

8.2.1 Collaborative cost of suspensions

Suspending joint commitment threatens face. To avoid that, participants have to jointly agree on the suspension. Face threat depends on the imposition of the threat and the willingness, or expectation, of people to accommodate to the threat (Brown & Levinson, 1967). These two aspects depend on the two partners. Imposition is controlled by the persons who are initiating suspensions. The willingness to accommodate depends on the persons who are left out. So partners assess face threat based on situational factors. Situational factors can facilitate or aggravate face threat. Suspending can be dealt with little or no redressive acts or with a lot of compensation. Situational factors depend mostly on interruptions and on the media of communication.

First, interruptions can last for a few seconds or they can last for a long time (between less than 3 seconds and up to a minute in Study 1). If partners have to suspend for a long time, they will provide more compensation for their partners. Also, the timing of an interruption can also be unfortunate. It could happen when partners are in the middle of an utterance. In Studies 1 and 3, listeners were more polite when they didn't have the floor, because they had to cut in on their partners' contributions. Analysis of audio recordings in Study 1 and transcriptions in Study 3 reveals that partners try to wait for the least imposing moment to initiate suspensions. Initiating a suspension is easier when partners have the floor. In Study 3, listeners minimized the imposition of suspension at reinstatement, by giving the floor back to narrators.

Second, the medium can be quite constraining too (Clark & Brennan, 1991). Similarly to their costs for grounding, media have costs for facework. Co-presence and visibility can greatly influence the compensations people have to offer. In Studies 1, 2 and 3, partners were not co-present, nor could they see each others. They only relied on audibility. Partners who were put on hold had no clue about the situation their other partners were in. As discussed in Study 1, we could expect that in co-presence, partners might be more willing to accommodate. By noticing the potential embarrassment of having to suspend, partners may

minimize the suspension in return. Also, if all parties are co-present, the person interrupting the pairs might take responsibility for the compensation for face threat. It seems that a third person could be easily ratified as a legitimate participant in the exchange. In our cases, interruptions have an external origin, so if partners share evidence about it, it should reduce the cost of facework.

Suspending joint commitment puts common ground at risk. The point of suspension affects the reinstatement of common ground. Often people are constrained to suspend. So they have little time to choose where to stop in their joint actions. They seem to prefer to initiate suspension at the end of joint actions. Some partners waited to have the floor in Studies 1 and 3, and in Studies 4 and 5, there were some cases where some partners took up the instructor's proposals, after the experimenter had uttered stop. At reinstatement, partners have to reactivate their joint projects. In joint projects, partners not only reiterate their goals, they also recreate joint closure of the course of actions. They need to share the belief they both know that they know they are at a given stage in common ground. If they can't assume it is true, they need to reconstruct common ground.

Thus, because common ground is an accumulation of joint projects, participants can refer to earlier shared information that was grounded. In Studies 4 and 5, participants referred to common ground to reinstate unfinished contributions, or to propose the next relevant contribution. These strategies depend on the state of common ground at suspension (in the middle of joint project or in between), on the decay of suspended goals, and on the availability of shared evidence. In Studies 4 and 5, Mid-task interruptions were more difficult to reinstate, because evidence of common ground was not shared. This was more the case at End-task, because joint projects were closed. Also in all our studies, long interruptions required more repetitions of earlier contributions, than when interruptions were very short. Finally, reinstatements depend on the communication medium and the evidence partners share about the progress of their joint project. In Study 5, visual cues allowed participants to reactivate common ground faster. They didn't rely on their mental representation of their partners and verbal evidence, when they couldn't see each other. For instance, they were able to use more deictic references to refer to information in common ground.

8.2.2 Suspension model

Here is now a description of the steps of a collaborative suspension based on our findings.

- 1) Suspension phase:
 - a) Participants notice a disruptive event and assess the need to suspend and potential face threat (Studies 1 to 3)
 - b) If they can, participants try to initiate the suspension at an opportune moment in the course of actions (e.g., partners waiting for narrators to finish their utterance in Study 3).
 - c) If needed, participants use negative face threat strategies to avoid face loss (e.g., minimize imposition, show reluctance, apologize in Study 1 to 3).
 - d) Participants agree on taking leave of each other momentarily (Studies 1 to 3)
- 2) Interruption phase: The partners don't interact. Depending on the communication medium, they may or may not be able to monitor the secondary activity in the background (Study 1).
- 3) Reinstatement phase:
 - a) Participants re-establish joint attention by signalling their readiness and willingness to continue (Studies 1 to 3).
 - b) Participants engage in facework if necessary (Studies 1 to 3).
 - c) Participants update common ground (Studies 1 to 5):
 - i) Participants reactivate the last suspended joint project (Studies 1 to 5).
 - ii) Participants regain common ground on current joint project, by (Studies 4 & 5):
 - (a) Repeating contributions in common ground.
 - (b) Referring deictically to what is in common ground.
 - d) Participants present the next relevant contribution to joint project (Studies 1 to 5)

As we discussed above, we studied situational parameters that influence the collaborative efforts, namely: participants' conversational role (Studies 1 & 3), timing of the events (Studies 4 & 5), and communication medium (Studies 1 to 5).

8.2.3 The cooperative principle in suspensions

Suspensions are not expected, and relatively speaking, they create additional costs in the collaborative process. There is little doubt about that. But overall, it seems that given the circumstances, partners in our studies kept collaborative costs at a minimum through the whole process. They contributed well enough to succeed in negotiating each of the

unexpected changes of purpose.

I suggest that in suspensions, partners follow a cooperative principle in a broad sense. It stems from Grice's cooperative principle, and how people ground joint projects: '[Participants] make their conversational contribution[s] such as required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which [they] are engaged.' (Clark, 1996, p. 140). We could look at the direction of the talk exchange as a "mutually accepted direction" (Clark, 1996, p. 140), or an accepted joint purpose. My point is that people contribute in regards to the current stage of the exchange. I broaden the context of exchange to the situation participants are in. I propose that they contribute in light of the circumstances. By expanding the stage to the situation, I assume participants are able to recognise changes of purpose in the "here and now" situation. That allows for participants to adapt to unexpected changes, such as dealing with suspensions. Each new project redefines the direction and the purpose of the exchange in an opportune way. This is similar to how participants ground their contributions. They update the mutual direction or joint purpose of the exchange. They recognize and take up on new proposals and change of purpose. Otherwise, they wouldn't be able to progress and navigate in negotiate joint projects. We also assume people contribute just enough for the current purpose, following the principle of least collaborative effort (Clark, 1996; Clark & Wilkes-Gibbs, 1986). These considerations, I believe, support the collaborative nature of how people negotiate with each new step in interactions.

Now how do these considerations apply to the suspension process? Participants agree upon each new purpose or change of direction in the process. It means that they agree on suspending and later reinstating. The suspensions are unfortunate, but participants still are committed to continuing the joint project, the joint purpose of the exchange. So they jointly negotiate each step in the suspending and reinstating phase. They also contribute enough for the current purpose (suspend project, redress face, check availability, redress face, reinstate project), given that these steps are relevant for the given stage of the exchange. Globally, participants moved on quite rapidly through the steps, and tried to keep costs at a minimum.

When engaged in facework, participants provide enough politeness to suspend. They were less polite when interruptions were short (Study 1). Though, it seems that participants took time in redressing face at reinstatement. This was the case in tasks that were less goal-

oriented, like in Studies 1 and 2. It is possible that the urgency of the situation required participants to be more Gricean than in another situation. Without time pressure, it is possible that people would use more indirect strategies. Consequently, these strategies would not be considered as efficient in terms of effort.

When reinstating joint projects, people also used evidence to contribute as little as needed (Study 5). They often seemed to provide enough information to reinstate common ground so they wouldn't have to engage in repairs (Studies 4 & 5). Rarely did pairs have different beliefs about what was in common ground. They were opportunistic in referring to information in common ground. They repeated more information at Mid-task than at End-task (Studies 4 & 5). They repeated less information after short interruptions than long interruptions in studies 4 and 5. They preferred repeating the last contributions, after short interruptions, rather than having to refer to earlier contributions, in Study 1. These seemed to be right strategies to continue with joint projects. Once participants reached closure, they moved on right away with new contributions.

8.2.4 Implications for collaborations in organizations

We can generalize the implications of our results to other situations, in particular in organisational settings. At work, many collaborative activities take place in dyads or groups and via different communication media. In global organizations, interactions are often mediated via audio and visual devices. These can be for instance, telephone calls, video-conferences, or even computer-mediated surgical operations. When interruptions occur, the amount of shared evidence may be limited and cost for face and reinstatement of common ground may be important. Cockpit crews, for instance, have numerous artefacts to support their joint activity. They have visual evidence that can help them remember where they are in their task (Hutchins, 1995). But they don't have evidence for what has been uttered.

Also, status and role of participants can be different in collaborative activities at work. These add more constraints to facework during interruptions. Face threat is related to illegitimate actions imposing on negative face or neglecting positive face. Legitimacy of tasks has a significant effect on stress (Semmer, Jacobshagen, & Meier, 2009). In field studies, interruptions often appear as legitimate (Perlow, 1999; Gonzalez & Mark, 2004). So there, face threat is expected to be minimal. But this might not always be the case. Certain tasks and actions are expected for different roles and status. Perception of imposition is different

for different status (Brown & Levinson, 1987). For instance, secretaries should expect interruptions from colleagues and supervisors. On the other hand, subalterns may be reluctant to interrupt their supervisor. When partners are interacting and are interrupted by a third party, then status of the party and the legitimacy of the interruption may have a different impact on the pair and on the person who has to deal with the third party.

Moreover, more microanalyses of interactions will help understand the impact of interruptions on multitasking, team work, and use of artefacts (e.g., Fussell et al., 2004; Grosjean, 2004).

8.3 Limitations

Studying conversation is not an easy task, particularly when researchers try to infer common patterns among populations of participants. It requires compromises between studying naturally-occurring phenomena and controlling parameters. Of course, ideal data comes from naturally-occurring phenomena. It provides opportunities to observe authentic and various parameters. But then, when researchers need to test hypotheses, experimental designs provide control over variables and allow for statistical analyses. Both methods are recommended (Clark & Bangerter, 2004). Of course, one of the disadvantages of experimental studies is the limited parameters that can be studied. But then, at the same time, their effects are easier to interpret.

We started with naturally-occurring suspensions, and derived hypotheses for facework and grounding processes. We tested them and came up with significant results in a correlational study (Study 1) and in an experimental design (Study 2). There, conversations were only constrained by a given topic. Then, we needed to replicate our findings, and have better control over participants' role, so we imposed on them to narrate stories. Then, we further tested grounding process and further controlled other contextual parameters. We controlled the activity and the participants' role in the interactions. We also further controlled the timing of the interruptions. The focus on grounding process and the need for precision required to avoid facework. So, as we further progressed on analyzing specific effects, we also had to give up on crossing other interesting parameters. For instance, we could have manipulated the collocation of participants (co-present or not) with duration of interruptions and measured differences in facework. We could have used another structured task with no visual evidence and see how this could have influenced reinstatements. There

are even more parameters we could have included. What else we could have done is addressed in the following section.

8.4 Further studies

8.4.1 Facework

As our studies suggest, participants are acting in a cost-effective way regarding the effort to reinstate. At times, participants don't use much politeness, seemingly to favour the reinstatement of the joint actions, even after long suspensions (see Study 3). Participants reinstate faster when suspensions are shorter. So it's possible that participants might refrain from extensive politeness to facilitate the reinstatement of the activity. There were cases in Study 1, in the corpus analysis where speakers "allow" themselves to skip redressive actions in favour of continuing the discussion and avoid repairs, when suspensions lasted only few seconds. If participants try to minimize collaborative costs, in which configuration of role, status and interruptions, do participants have to redress face? As I pointed out in the implication for organizations (8.2.4), it is not clear when people can afford or not to not be polite.

Also, we suggested that sharing evidence about the source of interruptions may facilitate facework. When participants are co-present, they may notice the disruption, may anticipate the suspension, be less offended, and facilitate the cost for the person who has to deal with the interrupting matter. Casual observations suggest that solicited participants may engage in less redressive acts to compensate other partner's face loss when a co-present third party initiates interruptions. The third party bears responsibility for threatening the pair's face. So we would expect the third party to use polite strategies and redress faces.

8.4.2 Common ground

Finally, as noted in our above discussions of cost-efficient reinstatement, participants seem to know how much information to provide to allow them to re-establish common ground. In Study 4 and 5, participants rarely didn't remember where they were. They at least remembered their last joint action, because it had been completed and they had some evidence of it. Most of turns were spent at reinstating uncompleted actions. But if we had pairs working with less evidence and longer duration, we could expect further effort to reconstruct common ground. In a goal-oriented task without visual evidence, pairs would

rely only on speech. It would then be interesting to see how they reinstate their stack of joint commitments. Also, it seems that past a few seconds, pairs have to repeat previous contributions. So it would also be interesting to find how long pairs can stop talking before having to reinstate their contributions. We could expect no repetition up to 1 or 2 seconds, and then verbatim repetition, until 3 or 4 seconds, and then more elaborate reinstatements.

Chapter 9 – Conclusion

We analyzed cases of people suspending joint activities. This phenomenon brought to light two important coordination processes: facework and grounding. Our results show that long interruptions had a negative impact on both processes. Participants in an audience role were also more polite. Also, participants took longer to reinstate when they could not complete their joint actions at interruptions. But this effect was not as important when participants shared evidence about the state of their task. Our results show the collaborative nature of suspending joint activities.

Suspensions have a drastic impact on interactive processes, and have the advantage of being manipulable. In particular, suspensions give opportunities to study facework. It is an important aspect of collaborative processes that is often left out of language studies.

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