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Research Article

‘Butterfly Effects’ in Dyadic Dynamics: A Complex Dynamic Systems Theory Perspective on Task-Based Interaction

Ryo Nitta [a] **and Fumiyo Nakatsuhara** [b]

[a] Meiji Gakuin University, Japan; [b] University of Bedfordshire, UK.

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ABSTRACT

While a substantial body of research on L2 oral performance has focused on aggregated outcomes, this study adopts a Complex Dynamic Systems Theory (CDST) framework to investigate the co-constructed processes inherent in dyadic interaction. Specifically, we explore the *butterfly effect*, wherein minor variations in initial conditions can lead to divergent interactional trajectories. A complex dynamic system comprises many interacting components, where micro-level interactions among components change their properties and, over time, create new properties at a macroscopic level (van Geert, 2011). From this perspective, participants are continuously influenced by their interlocutors through iterative processes of turn-taking, and a macro-pattern of discourse emerges as a result of dynamic co-regulation between the participants (Larsen-Freeman & Cameron, 2008). To investigate dyadic dynamics as a complex dynamic system, we conceptualized planning time (3 minutes vs. none) as the initial condition for a discussion task and re-analyzed the task-based interaction performed by 32 L2 learners in dyads (Nitta & Nakatsuhara, 2014). We employed a microgenetic approach, analyzing turn-taking dynamics and using Conversation Analysis to examine the qualitative features of the conversations to identify emergent interactional patterns under each condition. The analysis revealed a primary pattern observed in the majority of dyads: the non-planning condition fostered a highly collaborative mode of interaction, whereas the planning condition promoted a shift toward a sequence of monologues. However, a deviant pattern, identified in a minority of dyads, was characterized by consistent collaboration across both conditions. These findings suggest that while initial conditions like planning time are highly influential, their effects are not deterministic. We conclude that process-oriented, microgenetic methods are invaluable for understanding the nuanced dynamics of L2 interaction, and that CDST offers a promising theoretical lens for advancing both language learning research and pedagogical practice.

Keywords: Complex Dynamic Systems Theory; butterfly effects; pre-task planning; dyadic dynamics; Conversation Analysis

INTRODUCTION

This study investigates dyadic dynamics through the lens of Complex Dynamic Systems Theory (CDST), which recognizes that language learning is fundamentally embedded within a social context. Individuals are born into a "world of communication" (Clark, 2024, p. 25), where language competence develops not in isolation but through continuous engagement with others (e.g., Bruner, 1983; Kuhl, 2007; Tomasello, 1995). Within these interactions, interlocutors exert reciprocal influence, establishing the dyad as the foundational context for language use and learning. While this study focuses on the dyad, the importance of interaction can extend to larger group dynamics (e.g., Dörnyei & Murphey, 2003; Forsyth, 2021), a theme of this special issue. Indeed, the paramount importance of communication in this field is well-established; Beebe and Masterson (2014), for instance, argue that the quality and quantity of communication are the foremost components required to form a cohesive group.

The significance of interaction is also well-established in the area of second language acquisition (SLA), particularly within task-based language teaching (TBLT). Pedagogical tasks are designed to foster peer interaction, providing a context for communicative engagement and, consequently, second language (L2) development. While tasks are intended to simulate real-world language use, pedagogical adaptations, such as repetition (Bygate, 2001), planning time (Foster & Skehan, 1996), and manipulated time pressure (Yuan & Ellis, 2003), are often employed to enhance their effectiveness. Among these, pre-task planning has received considerable attention, with a consensus regarding its facilitative effects on task performance (see Ellis, 2009, for a comprehensive review). However, the micro-level processes by which pre-task planning influences the co-construction of discourse in dyadic tasks remain under-explored. Much of the existing research has focused on averaged or aggregated performance outcomes, assuming homogeneity in learner behavior across task phases (Samuda & Bygate, 2008).

To address this gap, this study examines dyadic L2 interaction as a complex dynamic system. From this perspective, the micro-level, reciprocal influence of

interlocutors through iterative turn-taking drives the dynamic co-regulation and evolution of macro-level discourse patterns (Cameron, 2015; Larsen-Freeman & Cameron, 2008; van Geert, 2011). We conceptualize pre-task planning as an initial condition of this system. The *butterfly effect*, one of the core concepts in CDST, posits that even a small difference in this initial condition—such as the presence or absence of planning time—can lead to significantly divergent systemic outcomes. This study analyzes the turn-taking trajectories of 16 dyads to investigate how these different initial conditions shape the emergent patterns of their co-constructed conversations.

LITERATURE REVIEW

Dyadic Interaction as a Complex Adaptive System

CDST provides a framework for understanding how macro-level behavioral patterns emerge from the non-linear interactions of micro-level components within complex systems. Characterized as a "metatheory" (Larsen-Freeman, 2013, p. 370) or a "robust supra-theory" (Cameron, 2015, p. 31), CDST encompasses a set of coherent ontological and epistemological principles such as non-linearity, complete connectedness and self-organizing nature (Hiver & Al-Hoorie, 2016). In contrast to positivist approaches, which assume group homogeneity, linear development, and the separability of causal variables, CDST emphasizes the holistic and situated nature of phenomena. As argued by Cameron (2015), CDST offers applied linguistics a powerful metaphorical model for describing and analyzing dynamic and context-dependent processes.

Previous research investigating the effects of pre-task planning has predominantly adopted a cognitive perspective, largely aligning with positivist paradigms that conceptualize learners as information-processing machines. However, this approach often overlooks the social and adaptive nature of interaction where interlocutors exert reciprocal influence. In contrast, interaction can be conceptualized as a *complex adaptive system*, where learners dynamically adapt and evolve in response to environmental and internal changes of the system. Within this framework, dyadic task-based interaction is viewed as a coupled system exhibiting emergent dynamics arising

from the mutual adaptation of individual participants (Larsen-Freeman & Cameron, 2008). More specifically, interactions in dyadic tasks are co-constructed through iterative language exchanges, wherein the conversational trajectory remains open and contingent upon the ongoing contributions of both speakers. Furthermore, each utterance leaves a trace that can alter the latent potential of language resources of each speaker, consequently leading to diverse patterns of change throughout a conversation. This phenomenon can be explained by the property of *iteration* where repeated operations serve as input for subsequent iterations, with the output of one iteration becoming the input for the next (Larsen-Freeman, 2009, 2018; Nitta & Baba, 2018). As de Bot et al. (2007) state, "the present growth level depends on the previous growth level plus the interaction between the resources available at that point" (p. 13). Following these processes, the iterative nature of these operations can generate varied, and at times unique, patterns of linguistic change over time. This continuous interaction and adaptation lead to dynamic modifications of individual language systems, contributing to learning, which is defined as "a transformation of the language resources of each participant, and on a longer time-scale and at another level, across a speech community" (Larsen-Freeman, 2010, p. 58).

Sensitive Dependence on Initial Conditions

In the context of language learning and testing, initial conditions are established by the specific configuration of a task (e.g., picture description) and its implementation (e.g., with or without pre-task planning). As Larsen-Freeman and Cameron (2008) emphasize, understanding these conditions—the state of the system at the onset of an activity—is crucial because they define the landscape of the system and significantly influence its developmental trajectory. Even seemingly minor initial factors can be amplified through the interconnectedness of the system, potentially leading to substantial effects. This principle is known as sensitive dependence on initial conditions, or metaphorically called the *butterfly effect*. The concept was first identified by meteorologist Edward Lorenz (1972), who observed that restarting a computational weather model with a slightly

rounded value (three decimal places instead of six) produced a drastically different outcome. His discovery demonstrated how a minuscule starting difference could be amplified through iteration to create divergent results—a phenomenon known as the butterfly effect, which draws an analogy where a butterfly's flapping wings in Brazil can cause a tornado in Texas (Briggs & Peat, 1999).

While the initial conditions of a task (how it is designed and how it is implemented) profoundly influence learner performance, a disconnect is often noted between the findings of TBLT research and the realities of the classroom. This discrepancy arises because traditional research has often focused on linear relationships and cognitive factors, neglecting the complexity and variability inherent in classroom context. This divergence is conceptualized through the distinction between the *task-as-workplan* (the intended pedagogical plan) and the *task-in-process* (what actually unfolds in the classroom). As suggested by Breen (1987/2009), the gap between the two is due to the "fairly unpredictable interaction between the learner, the task, and the task situation" (p. 334). Seedhouse (2005) argues that this poses a significant threat to construct validity in SLA research. Because the field tends to conceptualize tasks based on the *workplan* but gathers data from the *in-process* reality, what is measured may not be what was intended. This sensitivity to initial conditions is analogous to the butterfly effect. Citing Coughlan and Duff (1994), Seedhouse (2010) notes that the same task-as-workplan can yield incomparable results when performed by different people, or even by the same person on different occasions. To address this validity problem, Seedhouse (2005) advocates for a conceptual shift, urging researchers to make the task-in-process the primary focus of analysis.

Researching Interaction from CDST

To address the validity problem arising from the gap between the task-as-workplan and the task-in-process, the connection between task configuration (as an initial condition) and learner performance must be conceptualized as non-linear and dynamic. When dialogue is viewed as a complex adaptive system, it becomes clear

how small differences in initial conditions can be amplified through the iterative process of turn-taking, leading to divergent outcomes unpredictable from the workplan alone.

While this complexity makes precise prediction unattainable, such systems are not random; they tend to self-organize into discernible patterns of behavior known as *attractor states* (Hiver, 2015). In a dyadic system governed by attractor dynamics, a wide range of interactional trajectories, represented by each utterance, will eventually converge on a limited set of preferred, co-regulated patterns (Nowak et al., 2005). Through the continuous, reciprocal influence of turn-taking, participant behaviors settle into these emergent states (Larsen-Freeman & Cameron, 2008). The formation of these attractors is central to learning; each utterance provides linguistic exemplars that, over time, shape developmental pathways as certain interactional patterns become established.

The application of CDST to the study of L2 oral interaction remains limited. A notable exception can be found in research on group dynamics where Poupore (2018) conducted comparative analysis of small groups of Korean English learners performing interactive tasks. Adopting a CDST perspective, the study aimed to identify how elements such as learner emotions, behaviors, and task characteristics interacted to produce different group outcomes. While its primary focus was on behavioral and affective factors rather than linguistic exchange, the study underscored the critical role of task design as an initial condition influencing group dynamics. While favorable conditions such as opportunities for imagination and planning time fostered collaboration, unfavorable ones such as task difficulty and the pressure for a single answer were found to be detrimental to it.

A more direct investigation of interaction from a CDST perspective has been conducted by Siegel and Seedhouse (2024, 2025; Seedhouse 2010). They employ Conversation Analysis (CA) to investigate how learners develop and manifest *interactional competence,* “the ability to co-construct interaction in a purposeful and

meaningful way, taking into account sociocultural and pragmatic dimensions of the speech situation and event" (Galaczi & Taylor, 2018, p.226).

Siegel and Seedhouse (2025) highlight the theoretical synergy between CA and CDST, as both frameworks address emergent phenomena. CA reveals the co-constructed nature of social reality through detailed analysis of spoken interaction, while CDST explains how these micro-level interactions, through iterative processes such as turn-taking and self-organize into complex, non-linear patterns. This alignment allows the rich empirical data from CA transcripts to serve as a basis for understanding dynamic processes at a microscopic level. Thus, the synthesis of CA and CDST pioneered by Siegel and Seedhouse provides a powerful methodology for exploring the micro-level mechanisms that drive dyadic dynamics.

THE PRESENT STUDY

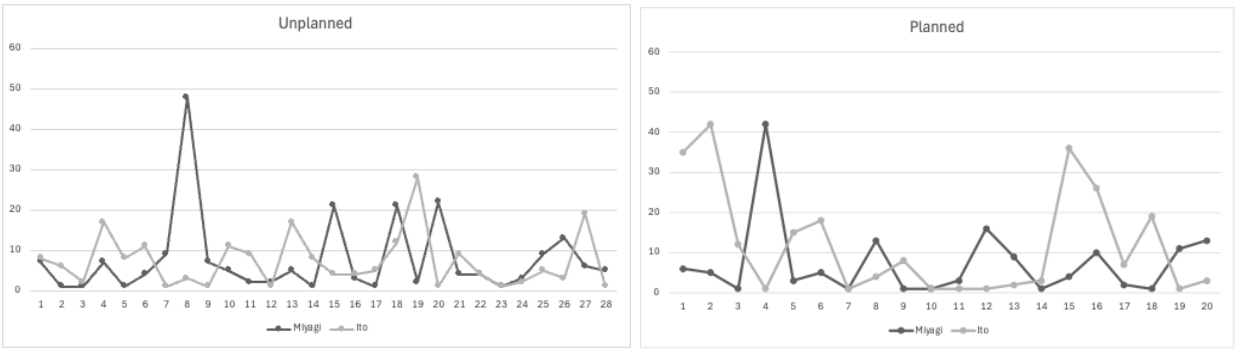
Building on the previous research, the present study adopts a CDST perspective to analyze dyadic interaction. Specifically, we focus on the iterative process of turn-taking and its trajectories to investigate how emergent patterns of interaction are influenced by pre-task planning conditions. To this end, we conduct a new analysis of data originally collected by Nitta and Nakatsuhara (2014), which consists of 16 dyads performing discussion tasks with and without planning time.

Background: The Nitta and Nakatsuhara (2014) Study

Nitta and Nakatsuhara (2014) employed a multi-method approach to investigate the effects of pre-task planning on paired oral performance, integrating discourse analytic measures (e.g., fluency, complexity, accuracy), rating scores, questionnaires, and CA. Among the discourse analytic measures, a key variable was the number of words per turn, which yielded a statistically significant difference between conditions ($t(22)=2.743$, $p=.010$). Participants produced significantly longer turns in the planned condition (M = 10.02, SD = 7.23) compared to the unplanned condition (M = 7.97, SD = 7.19). To

illustrate this finding, the authors selected a representative pair (Pair A: S01 & S02) whose performance approximated the group average. Figure 1 illustrates the turn-length trajectories for this pair.

Figure 1. *Changes of Turn-length (Pair A)*



To complement and expand upon the statistical findings and turn-length trajectories, Nitta and Nakatsuhara (2014) used CA and explored how participants co-constructed meaning. In particular, they utilized a framework of three discourse modes, originally identified by Galaczi (2008) building on Storch (2002), to classify the interactions:

- **Collaborative Mode**: Characterized by a fluid exchange of speaker-listener roles. Participants actively engage with, support, and build upon topics initiated by their partner, resulting in the co-construction of ideas.
- **Parallel Mode**: Resembles a series of parallel monologues where speakers initiate and develop their own topics with limited engagement or uptake of their partner's contributions.
- **Asymmetric Mode**: Involves an unbalanced distribution of talk and influence. One speaker dominates the interaction in terms of quantity of speech and topic development, while the other assumes a more passive or secondary role.

In Pair A, the unplanned condition was distinguished by prominent collaborative interaction, especially evident in the frequent, short turn exchanges at the beginning. Hesitant speech and initial pauses indicated the cognitive load of on-the-spot planning. However, as the conversation progressed, the participants successfully co-constructed the dialogue by mutually developing each other's opinions. This collaborative dynamic persisted, with later turns often referencing earlier topics, and turn lengths became longer and more balanced toward the midpoint. In contrast, the planned condition for the same dyad was characterized by parallel and asymmetrical modes. They delivered longer, slower utterances that adhered closely to their prepared content. This often resulted in a series of monologues with monotonous turn-taking and points of stagnation. In other words, the interaction became asymmetric, with one participant dominating the talk time, leading to fewer turns overall and significant disparities in turn length.

Rationale for the Present Study

The CA findings from Nitta and Nakatsuhara (2014) provided an important avenue for complementing their statistical results, suggesting that pre-task planning can fundamentally alter the nature of dyadic discourse and may limit opportunities for collaborative interaction. While their study identified these patterns, it did not analyze them through the lens of complexity and emergence. Thus, the present study extends this previous study by re-examining the interactional patterns of 16 dyads through the theoretical framework of CDST. By applying CA to the turn-taking trajectories, we aim to model how these dyadic systems evolve over time and how initial conditions–with and without planning–shape their emergent, dynamic properties. As such, this study is a re-analysis of the dataset from Nitta and Nakatsuhara (2014), conducted under a different theoretical framework and methodology.

METHOD

Participants

This study included 32 English majors from a Japanese university, all of whom were either second- or third-year students. Their first language was Japanese, and they had an average of 8.52 years (*SD* = 1.43) of English learning experience. None had significant prior experience living in an English-speaking country. This ensured a relatively homogeneous participant group in terms of age, first language, and educational background. Their overall English proficiency was assessed as approximately B1 (Threshold) level according to the Common European Framework of Reference for Languages (CEFR; Council of Europe, 2001), based on their recent TOEFL ITP scores (measuring listening, reading, and grammar), which averaged 476.41 (*SD* = 31.24) (ETS, 2012). Additionally, class teachers confirmed their oral proficiency was predominantly at the B1 level, with only a few exceptions reaching B2. For pairing, participants were freely assigned with friends, forming 16 dyads. Data collection took place during their preparation for study abroad, with a speaking test administered as part of their pre-departure English language assessment. Pseudonyms are used for the participants in the findings section.

Task Procedure

Sixteen pairs participated in a speaking test consisting of one warm-up task, followed by two decision-making tasks. These decision-making tasks were administered under two distinct conditions: one with a 3-minute pre-task planning time and one without a planning time. To mitigate practice effects across the two performances, the order of the planning conditions and the task prompts were counterbalanced across all 16 pairs. Each task was performed for a duration of 5 minutes, and all sessions were video-recorded for analysis.

Task Design

Each speaking session began with a 2-minute warm-up where participants introduced each other, followed by two decision-making tasks. These decision-making tasks, adapted from Part 3 of the Cambridge B2 First speaking test (formerly known as FCE), are designed to assess their interactional abilities, including sustaining interaction, exchanging ideas, expressing agreement/disagreement, making suggestions, and collaboratively negotiating a decision.

Figure 2. *Task Sheet for the Happiness Task, with Images Adapted from the Original Source*

Happiness Task: Here are some of the things in life which can affect our happiness. First, discuss with your partner how important each of these things is for a happy life. Second, decide which two are the most important.

We prepared four tasks: Happiness Task, Profession Task, Cafe Task, and Tourists Task. Figure 2 provides a sample task sheet (see Appendix A for the information and instructions for all four tasks). Participants received both oral and written instructions, along with a task sheet displaying 7–8 visual items for each. They

first discussed each item in relation to a given topic and then had to reach a consensus on one or two items. For each pair, two tasks were selected from this pool. Given their source from official Cambridge B2 First/FCE practice papers (Cambridge ESOL, 2008, 2012), the tasks were considered to have comparable difficulty.

Planning

This study assumes pre-task planning as a control parameter that modulates the dynamics of dyadic interaction, viewed as a complex adaptive system. To operationalize this, a three-minute, unguided pre-task planning period was implemented for the planning condition. Participants were instructed to prepare individually, without discussing their plans with their partner. Furthermore, the use of external resources (e.g., dictionaries, the internet) was not allowed. Although participants were permitted to take notes during the planning phase, they were informed that these notes could not be referred to during the task performance. All instructions were delivered in English, both orally and in writing.

Analysis

This study investigates how initial conditions—specifically, the presence or absence of a planning phase—influence the subsequent dynamics of dyadic interaction. Drawing on CDST, we seek to identify potential *butterfly effects*, where small starting differences can generate diverse and complex interactional outcomes. To chart these dynamic shifts, the analysis focuses on turn-taking trajectories. Turn-taking is a fundamental principle of conversational organization (Sacks et al., 1974), and from a CDST perspective, its trajectory is not a superficial feature but a trace of the underlying evolution of the system. Examining these trajectories allows for the identification of emergent patterns arising from the intricate interrelationships between speakers.

Considering its relevance to previous research and the aims of this study, this research adopts CA to investigate the nuanced dynamics of task-based interaction.

Although most commonly associated with natural conversation, CA has been effectively extended to institutional settings, including language classrooms and testing environments (Brown, 2003), leading to specialized frameworks such as CA-SLA (Kasper & Wagner, 2011) and CA-CDST (Siegel & Seedhouse, 2025).

The analytical procedure involves two stages. First, turn-taking trajectories from all 32 dialogues (16 dyads in planned and unplanned conditions) were plotted to identify overarching interactional patterns. Second, based on this initial analysis, each conversation was subjected to a detailed qualitative examination using CA. This two-step approach allows for both a broad view of systemic behavior and a microscopic analysis of the co-constructive processes at play.

In the analysis, we employed a collection-based approach to identify recurring patterns by comparing and contrasting individual instances. This method, as described by Mazeland (2006), allows for a series of single-case analyses to build a clearer picture of a phenomenon by detailing “how, and the degrees to which they are the same, similar, or different” (p. 138). This process helps to precisely define case collections and identify subcategories (Kasper & Wagner, 2014). A key step in this approach is paying close attention to deviant cases—any instances that do not fit the established patterns. Examining these cases can be crucial, as a boundary case might eventually provide a form of second-order validation for the primary pattern (Mazeland, 2006).

For the analysis, we transcribed video-recorded participant performances using a simplified set of CA symbols, primarily derived from Atkinson and Heritage (1984; Appendix B). This standardized notation system sufficiently represents turn-taking, pauses, overlaps, and other interactional nuances critical for understanding the dynamic flow of conversation. To further bolster the accuracy and reliability of the transcriptions, the second researcher independently checked all transcribed data. Any discrepancies identified during this independent verification process were then thoroughly discussed between the researchers, with the goal of achieving consensus on an accurate representation of the interactional data.

FINDINGS

Our analysis of turn length and interactional dynamics across all sixteen pairs revealed distinct patterns tied to planning conditions. Specifically, eleven pairs (68.75%) demonstrated a more collaborative interaction style in the unplanned condition, contrasting with a more parallel style in the planned condition. This finding is consistent with the representative pair (Pair A) described by Nitta and Nakatsuhara (2014). The remaining five pairs (31.25%) diverged from these patterns and are thus considered deviant patterns. This paper will first illustrate the primary patterns of interaction with two example cases under both planned and unplanned conditions. Following this, we will present a detailed examination of one of the deviant cases.

Analysis of Turn-taking Dynamics

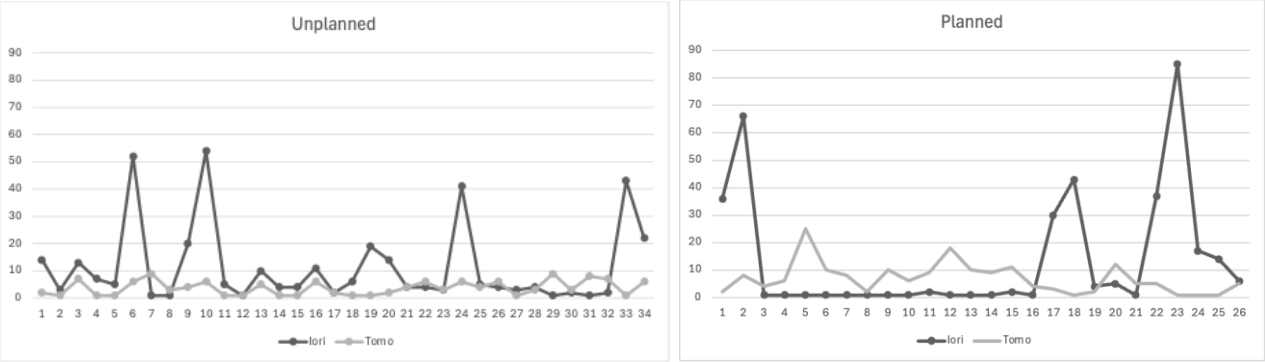
To illustrate the findings, this section presents an analysis of three representative dyads selected from the dataset. Two pairs, Pair 1 (Iori and Tomo) and Pair 2 (Nao and Jun), were chosen as they exemplify the primary interactional pattern observed: a collaborative style in the unplanned condition and a parallel style in the planned condition. A third dyad, Pair 3 (Yui and Sakura), was selected for analysis as an atypical (or deviant) case that diverged from the dominant patterns by maintaining a collaborative style across both conditions.

Figure 3 illustrates the turn-length trajectories for the three dyads across the unplanned and planned conditions. In each graph, the vertical axis represents the word count per turn and the horizontal axis shows the progression of turns; thus, higher peaks indicate longer utterances, while a series of low peaks signifies a rapid exchange. These graphs reveal distinct patterns that align with our qualitative findings. For Pairs 1 and 2, the unplanned condition is characterized by a high frequency of short turns (a dense series of low peaks), visually corresponding to a collaborative, interactive dialogue style. In contrast, their planned condition shows a lower turn frequency dominated by significantly longer utterances (high, prominent peaks), illustrating a shift toward a parallel, monologic style of interaction. The deviant case,

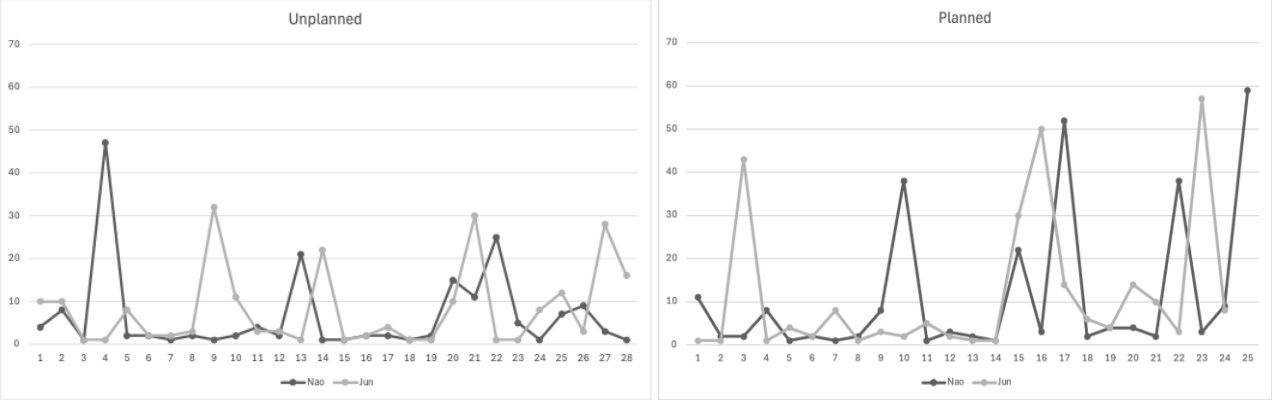
Pair 3, presents a notably different dynamic, as its trajectories are similar across both conditions. Unlike the other pairs, their graphs consistently show a frequent exchange of short-to-moderately-sized turns, reflecting a sustained collaborative style that was unaffected by planning time. Overall, these divergent graphical patterns indicate that the initial planning condition might have a significant and varied impact on the interactional dynamics of each dyad but in different manners. To understand the qualitative nature of the interactions that produced these trajectories, we now turn to the CA.

Figure 3. *Turn-length Trajectories for the Three Dyads Across the Unplanned and Planned Conditions*

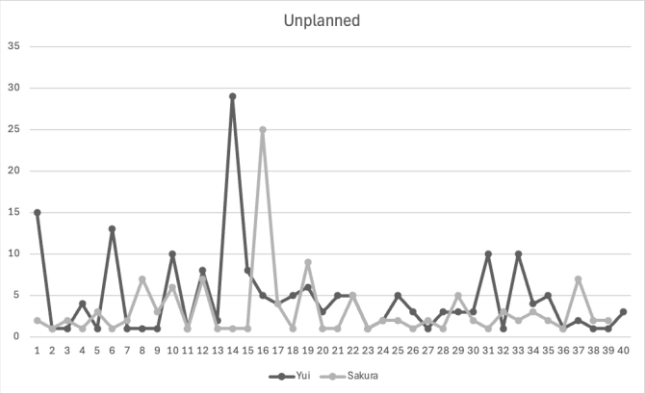
Pair 1

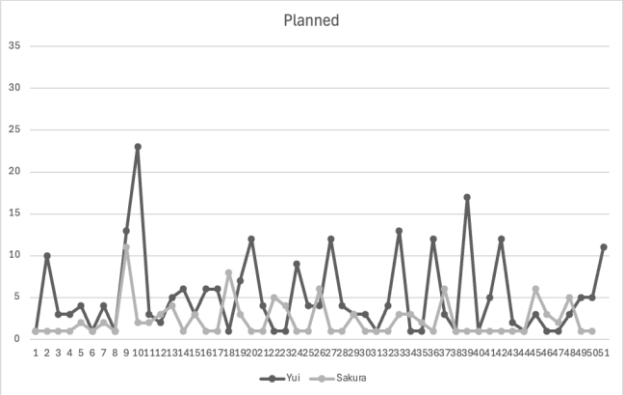


Pair 2



Pair 3





Co-construction in the Unplanned Condition

Unplanned interaction in Pair 1 (Iori and Tomo). The unplanned conversation of Pair 1 (Iori and Tomo) exemplifies a collaborative interactional style. A general, frequently observed strategy in this condition was the use of initial questions to co-construct the dialogue. This approach appears to serve as a method for generating ideas in real-time, given the lack of preparation time. Excerpt 1 illustrates this pattern, beginning with Iori asking Tomo about his café preferences, a question not directly related to the task prompt.

Excerpt 1: *Iori & Tomo discussing café preferences*

```
1       Iori: First of all (.) before we do this- um (1.0) like
2             (.) which café do you go?
3       Tomo: Which caf(h)é- (.5)
4       Iori: like to go
5       Tomo: (2.0) Café
6       Iori: like do you like Do you like Komeda?
7             [Would you like to go to-
8       Tomo: [yeah but (.) um (.5) I seldom [go there
9       Iori:                                [Uh uh (1.0) I (.) I
10            um I like café.=
11      Tomo: =Where?
12      Iori: um (.5) I like (1.0) like Starbucks
13      Tomo: Yeah
14      Iori: but um (2.0) um (.) I I don't like Komeda (.)
15            because (.) ah the atmosphere in the (.)like
16            um design? (.) the shop-like (.) nante iundaro?
17            Um (.) like (.) yeah yeah like design <design->
18            not (.) good (.) and (.) not (.) calm. And
19            (2.0) um (2.0) I really like um (.) fancy- (.)
20            like café
```

```
21      Tomo: un:
        Iori: like um (.5) like (3.0) like um (2.0) feels like
              (.) at home? (.) <and> (.) yeah (.) What do you
22            think?
23      Tomo: I think (.) um (.) atmosphere? (h) is very
24            important.
25      Iori: [Yeah yeah.
26      Tomo: [Coz (1.0) um (.) yeah (.) it is the place for (.)
27            rest?
28      Iori: uh huh
29      Tomo: 2.0) some- um (3.0) yeah
30
31
```

In this exchange, Iori initiates a topic and, after some clarification, explains his preference for Starbucks over Komeda (both are popular café chains) based on its relaxing, "at-home" (line 23) atmosphere. Tomo immediately aligns with this reasoning, affirming that atmosphere is "very important" (lines 25-26) and extending the idea by framing the café as a place for "rest" (line 29). This sequence, where one participant's idea is immediately adopted, affirmed, and elaborated upon by the other, is a clear example of collaborative co-construction of a dialogue.

Interestingly, the word "atmosphere" becomes a recurring theme, almost a *leitmotif*, throughout their subsequent conversation, even as they transition to the specific task questions. For example, after discussing the importance of furniture, sofas, and music to attract customers, the word reappears to summarize their collective thoughts:

Excerpt 2: *Reappearing "atmosphere"*

```
1       Iori: Iori: Yeah (.) Or or (.) anything else?
2       Tomo: Atmosphere=
3       Iori: =atmosphere yeah
4       Tomo: only:
5       Iori: OK! (.) So (.) <I think> (2.0) <we both think
6             that> (.) this one? ((pointing at the
7             picture))
8       Tomo: [%This one% ah yeah yeah
9       Iori: <is> (.) important (.) to attract people
10      Tomo: Yeah
```

In this part of the conversation, Iori quickly latches onto Tomo's contribution (line 2), repeating the word "atmosphere" (line 3) to show alignment. Tomo's use of "only" (line 4) emphasizes that atmosphere is the single most important criterion for him to choose

a café, which Iori then paraphrases as “important to attract people” (line 9). This co-construction continues, with Iori explicitly building on their previous discussion:

Excerpt 3: *Elaborating “atmosphere”*

```
1       Iori: uh I think <café> (.) like the purpose of café (.)
2             is (.) not just um (.) <menu> (.) <but> (.) as you
3             mentioned (.) atmosphere
4       Tomo: yeah
5       Iori: like (.) talk to friends with a relaxed (.)
6             atmosphere.
7       Tomo: yeah
8       Iori: and (.) that is the most- um (.) important (.)
9             thing for café (2.0) like (.) but what about open
10            café?
11      Tomo: Open café (.5) I don’t like it.
12      Iori: You don’t like open café huh huh
13      Tomo: um (.) <other people>
14      Iori: um
15      Tomo: watch
16      Iori: ok yeah yeah yeah
17      Tomo: watch me?
18      Iori: yeah yeah
19      Tomo: So (.) I don’t <relax>
20      Iori: yeah yeah yeah
```

In Excerpt 3, Iori’s phrase “as you mentioned” (lines 2-3) explicitly shows he is constructing his turn based on their shared conversational history. Tomo’s subsequent contribution about not liking open cafés because “other people/watch me” (lines 13, 15, 17) and it makes him “don’t relax” (line 19) further reinforces their central theme of atmosphere and comfort.

The conversation concludes with both participants returning to and reinforcing their core idea:

Excerpt 4: *Summarizing and concluding the discussion*

```
1       Tomo: um (1.0) so how about this one?
2       Iori: Like um (.) people- I think (.) <if the Jone’s
3             café> right? (.) <give people> (.) <free ticket
4             then they will come> (.) <but> the- (.5) like
5             (1.0) like uh how do you say (.) basic (.) basic
6             problem (.) like atmosphere (1.0) <if that won’t
7             change> then people won’t come [again
8       Tomo:       [yeah
9       Iori: continually (.) So (.5) I think it’s uh music and
10            (1.0) uh furniture (.) interior ((tapping the
```

```
11              pictures)) will be um the most two (1.0) important
12              things to attract people.=
13      Tomo: =Yeah, I think so, yeah.
```

In this concluding exchange in Excerpt 4, Iori summarizes their main argument. He contrasts a practical and rather easy solution, giving “free ticket” (lines 3-4), with the fundamental issue, arguing that without solving the “basic problem” (lines 5-6) of atmosphere through factors such as music (line 9) and furniture (line 10), customers will not return. Tomo’s final, unequivocal agreement (“Yeah, I think so, yeah” [line 13]) solidifies their shared perspective. This series of exchanges demonstrates a clearly collaborative process, where Iori and Tomo successfully transform their individual contributions into “a collective experience” (Hayashi & Mori, 1998, p. 81).

Unplanned interaction in Pair 2 (Jun and Nao). The unplanned interaction of Pair 2 (Jun and Nao) also demonstrates a co-constructive and collaborative nature. Lacking preparation time, they formulated their thoughts in real-time, resulting in an initial phase of rapid and brief exchanges. A notable feature of their dialogue is the repeated use of the phrase “would like to go” and its variations. This formulaic frame appears to structure their exploration of why people might travel to the various locations depicted in the task, as shown in Excerpt 5.

Excerpt 5: *Discussing travel preferences for popular destinations*

```
1       Jun:  um (.) which place- (.) which place (.) do you want
2              to go?
3       Nao:  hah hah (.) I wanna go (1.0) um (1.0)
4       Jun:  this is very popular place (.) these are very
5              popular places.
6       Nao:  yeah
7       Jun:  yeah
8       Nao:  so I’d like to go the- (.) beach
9       (…)
10      Nao:  yes (.)and the (.5) and also (.) j- Japan
11      Jun:  un
12      Nao:  um doesn’t have a(.5) doesn’t have- (.) this kind
13             of beautiful sea
14      Jun:  um
15      Nao:  so (1.0) so (.) that’s why I’d like to go
16             there.
17      Jun:  um
18      Nao:  yeah
```

```
19      (…)
20      Jun:  I'd- I'd like to go- (.) to the mountain
21      Nao:  yeah (.) why?
22      Jun:  mountain side
23      Nao:  yeah why?
24      Jun:  (1.0) um (1.0) summer? (.) summer
25      Nao:  yeah yeah
26      Jun:  in Japan so (.) mountain is- (.5) maybe-
27      Nao:  un huh
28      Jun:  (.) cool
29      (.)
30      Nao:  un
31      Jun:  so I'd like to go there
32      (…)
33      Nao:  um (1.0) because um (.5) if- if people (.) study
34             heh heh if people study history?
35      Jun:  um
36      Nao:  so they would- (.) they like to- (.) go there
37      Jun:  yeah
38      Nao:  yeah (.) or
39      Jun:  people who like (.) to study history
40      Nao:  yeah
41      Jun:  like (.) likes to go there
42      Nao:  yeah
43      (…)
44      Jun:  and (.5)  ar- art gallery?
45      Nao:  un
46      Jun:  is also (1.0)
47      Nao:  yeah people who like
48      Jun:  yeah
49      Nao:  art?
50      Jun:  yeah
51      Nao:  would go- (.) would like to go there
52      Jun:  yeah
```

Throughout these exchanges, the repeated use of the phrase "would like to go" serves two key functions. First, from a psycholinguistic perspective, employing a recurring and familiar expression helps automate parts of their speech, freeing up cognitive resources for on-the-spot planning of new content (Bygate, 2001). Second, it serves a discourse function by creating a predictable conversational frame (Bygate & Samuda, 2008). Given that the task is centered on travel preferences, this repetition provides a clear, shared structure for their interaction, making their contributions coherent and easy to follow.

Another defining feature of their co-constructed conversation is the use of *anticipatory completion* where a listener finishes a speaker's sentence or thought by accurately predicting what the speaker is going to say next, based on the grammar, syntax, and context of the ongoing conversation (Lerner, 1996; Lerner & Takagi, 1999).

In Excerpt 6 below, they express concern about how tourism might disrupt the tranquility of the countryside.

Excerpt 6: *Becoming noisy in the countryside*

```
1       Jun:  how about countries- countryside is-
2       Nao:  um %difficult%
3       Jun:  I- I said (.) this is (.) very silence place
4       Nao:  um
5       Jun:  places so (1.0) I think many tourist- if many
6              tourists go there?
7       Nao:  um hm
8       Jun:  the silence is (1.0)
9       Nao:  um (.5) was
10      Jun:  yeah was=
11      Nao:  =broken
12      Jun:  broken yeah yeah
13      Nao:  yeah
14      Jun:  noisy place
15      Nao:  un
16      Jun:  it be- it become (.) it will become
17      Nao:  yeah
18      Jun:  noisy places.
```

Here, Jun's utterance, "the silence is" (line 8), is met with Nao's correction, "was" (line 9), followed by the collaborative completion of "broken" (line 11). Jun then immediately repeats "broken" (line 12) and acknowledges it with "yeah yeah" (line 12). He further paraphrases the point as "it will become noisy places" (lines 16, 18). This entire sequence is a good example of anticipatory completion. Taken together, these characteristics demonstrate that under the unplanned condition, the conversation between Jun and Nao was a highly co-constructive process that emerged naturally from their need to build ideas collaboratively.

Parallel Interaction in the Planned Condition

In contrast to the dynamic co-construction observed in the unplanned condition, the planned dialogues of most dyads were characterized by a parallel interaction style. While participants discussed ideas, their turns often resembled a series of monologues punctuated by minimal exchanges rather than a truly integrated dialogue. This pattern is exemplified in the interaction of both Pair 1 and Pair 2.

Planned Interaction in Pair 1 (Iori and Tomo). In the planned condition, one participant typically opened with a lengthy, prepared statement, which contrasted with their usual frequent turn exchanges. In Excerpt 7, Iori begins by outlining a classification he had formulated beforehand:

Excerpt 7: *Iori's prepared opening*

```
1       Iori: so (.) um (7.0) %how difficult it is to be
2             successful in this professions% (2.0) um
3             (2.0) I (7.0) um (.) I divided it <into> two
4             groups.
5       Tomo: yeah what?
6       Iori: <One is um> (3.0) like a (.) sense? and like
7             talents
8       Tomo: %um% yeah
9       Iori: a:nd (.) the other one is (.) ah effort
10      Tomo: um
11      Iori: <and> I think (.) like (.) um painter (.) <and
12            musician and> like soccer player (.) they (.)
13            <need> (.5) of course they need efforts but (.)
14            like (.) um (.) sense like talent is um (.)
15            greatly (.) <in related to the profusion> (1.0)
16            like to be successful in (.) the (.) profession.
17            so um (3.0) like (2.0) person who has talent-
18            talents and they can be (.) like success-
19            successful
20      Tomo: ((nodding))
21      Iori: I think (.) <but like> (3.0) %I don't know%
22            What do you think? (2.0) %how difficult it is-%
```

Iori proposes classifying the eight professions into two groups: those requiring "sense" or "talents" (lines 6-7) and those requiring "effort" (line 9). Following Iori's framework, Tomo proceeds to offer his own prepared thoughts on each profession in a series of extended turns, as shown in Excerpt 8.

Excerpt 8: *Tomo's monologues on various professions*

```
1       Tomo: ballerina
2       Iori: um
3       Tomo: (1.0) <ballerina (.) must (.) dance very very well>
4       Iori: Yeah
5       Tomo: (2.0) so- and (.) they have to be soft? Their body?
6       Iori: um
7       Tomo: body. (.5) and: (.) yeah so (.) >I think it's
8             difficult< and (.) paint (.) <painter-> (.5)
9             must draw very very well
10      Iori: um
11      Tomo: and (1.0) they (.) <they have to have> (1.0) a
12            sense of inspiration?
```

```
13      Iori: [um
14      Tomo: [and and so on impression and so on.
15      (…)
16      Tomo: in doctor
17      Iori: um
18      Tomo: doctor (1.0) of course doctor has- (1.0)
19            <doctors have to be smart>
20      Iori: um
21      Tomo: and (1.0) they need <more more experience>
22      Iori: Uh huh
23      Tomo: (1.0) <because> (1.0) they-
24      Iori: [right right
25      Tomo: <their job> (.) is (.) <to save people's life>
26      (…)
27      Tomo: a::nd (.5) <singer is> (.5) <singer is
28            difficult> (.) <to be a famous singer>
29      Iori: um right
30      Tomo: (1.0) <and they need> (.) <people's
31            popularity>
32      Iori: uh huh
33      Tomo: (1.0) so- (1.0) um (1.0) <they> (1.0) they have to
34            be impressed (.) by people
35      Iori: uh huh
36      Tomo: and so >I think it's< (.) the most difficult
37            ((pointing at the picture)) singer?
38      Iori: Singer. OK
39      Tomo: Yeah
```

Notably, during a series of Tomo's monologues, Iori limits his contributions to minimal responses such as "Yeah…" and "Uh huh," without commenting on, questioning, or developing Tomo's ideas. This passive listenership continues until the topic shifts to a profession Iori was evidently prepared to discuss:

Excerpt 9: *Shifting to Iori's prepared topic*

```
1       Tomo: and (.) soc- footsal? player (.) ((pointing
2             out the picture)) What do you think about?
3       Iori: (1.0) soccer?
4       Tomo: um (.) <soccer> um (.) everything (1.0)
5       Iori: soccer (1.0) like (.) <I know> (.) uh I have a
6             friend (.) who (.) became a J league profe-
7             like professional (.5) player. And he is
8             Brazilian and in (.) he he taught me a Brazilian
9             dance
10      Tomo: Yeah I know
11      Iori: and um (2.0) anyway, ah (2.0) like (2.0) I think
12            (1.0) <if> (1.0) um people good at (.) baseball or
13            like sport s (.) soccer and they can (.) become a
14            professional
15      Tomo: yeah
16      Iori: I think eas- (1.0) a- easier (.) <than the other>
17      Tomo: um
18      Iori: <othe:r profession> I think
```

In this excerpt, Iori's participation shifts abruptly as he takes an extended turn to share a personal anecdote. The stark change in his engagement level strongly suggests his participation was dictated by his prepared content. That is, when the topic aligned with his plan, he spoke at length; otherwise, he remained a passive listener. This indicates that participants in the planned condition were more focused on delivering pre-formulated ideas than on co-constructing a shared dialogue. As a result, the interaction became a series of monologues, a stark contrast to the dynamic exchanges of the unplanned condition.

Planned interaction in Pair 2 (Jun and Nao). While the planned conversation of Pair 2 also exhibited a parallel interaction style, it manifested differently than in Pair 1. Their dialogue was characterized by a series of aborted topic initiations: one speaker would pose a question, the other would offer a hesitant or underdeveloped response, and the topic would be quickly abandoned. This pattern shifted when a topic aligned with one participant's prior planning. In Excerpt 10, after Jun asks for Nao's opinion on opening a café at night, Nao provides a notably more detailed response:

Excerpt 10: *Nao's prepared response*

```
1       Jun:  How- how about you?
2       Nao:  so (.) but (.) so (.) people after (.) people after
3              work
4       Jun:  yeah
5       Nao:  and (.) but (.) err but (.) but if they want to
6              (.5) err but if they want to talk with cow- co-
7              worker
8       Jun:  un
9       Nao:  or (.5) or or (.5) friend?
10      Jun:  un
11      Nao:  after (.5) after school
12      Jun:  un
13      Nao:  yeah (.) they can (.) they can (.) they can get
14             together?
15      Jun:  un
16      Nao:  yes and (2.0) get together and hah can drink
17      Jun:  un
18      Nao:  or something
19      Jun:  I- I think it is good [.] to open <until about
20             twelve o'clock> hu huh
21      Nao:  um
22      Jun:  yeah (2.0) yeah
23      Nao:  um (.) twelve-
24      Jun:  twelve o'clock or eleven o'clock
```

```
25      Nao:  um
26      Jun:  so (.)
27      Nao:  midnight is
28      Jun:  yeah not so good
29      Nao:  yeah not so good (.5) yeah
30      Jun:  how about this one menu
```

Despite Nao's rather developed contribution, Jun is unable to build upon Nao's ideas. After a brief attempt to expand on the topic, he quickly abandons it and moves on ("how about this one menu" [line 30]). This interaction highlights a key characteristic of the parallel style observed in the planned condition: even when one participant introduces a developed idea, the other does not engage with it, instead remaining focused on their own prepared content or moving to the next topic.

In summary, the CA reveals a stark contrast in the interactional dynamics of Pairs 1 and 2 across the two conditions. The unplanned conversations consistently fostered a collaborative style, characterized by the co-construction of ideas as participants built upon each other's turns to create a shared dialogue. In contrast, the planned conversations promoted a parallel style of interaction, which resulted in a series of monologues, monotonous turn-taking, and a general failure to develop ideas initiated by their partner.

Deviant Patterns

While the majority of dyads (11 out of 16, or approximately 69%) followed the primary macro-pattern, i.e., collaborative interaction in the unplanned condition and parallel interaction in the planned, a notable minority (5 out of 16, or 31%) diverged. These cases are therefore classified as deviant. Among these, Pair 3 (Yui and Sakura) presents a particularly insightful case for analysis. Unlike the majority, the distinction between their planned and unplanned interactions was minimal, as they maintained a consistently collaborative and co-constructive dynamic across both conditions.

Unplanned Interaction in Pair 3 (Yui & Sakura). The interaction of Pair 3 (Yui and Sakura) was characterized by frequent, short-turn exchanges that, in the unplanned condition, fostered a highly collaborative dynamic. They actively engaged with each other's contributions, often co-constructing single ideas across multiple turns. Excerpt 11, where they discuss why beaches are attractive tourist destinations, demonstrates this process.

Excerpt 11: *Yui & Sakura on beaches*

```
1       Yui:    ok, how about next one? (1.0) *beach*
2               <%beach%>…
3       Sakura: I think <people>(.) (h) people: want
4               forget(.) everything in- (2.0)
5       Yui:    like a heaven
6       Sakura: yeah
7       Yui:    hah, hah, hah yeah (.) escape from real
8               life=
9       Sakura: =yeah
10      Yui:    hah, hah, hah dream <live> in a dream=
11      Sakura: =um (.) just have a fun-
```

When Sakura produces an incomplete utterance ("people want forget everything in-" [lines 3-4]), Yui immediately completes and reframes it as "like a heaven" (line 5). Yui then continues to build on this shared idea with further paraphrases ("escape from real life" [lines 7-8], "live in a dream" [line 10]), which Sakura affirms (line 11). This sequence of collaborative completion and extension is characteristic of their co-constructive approach.

Another excerpt, where they discuss the appeal of the countryside, further illustrates their use of various co-constructive techniques.

Excerpt 12: *Yui & Sakura on the countryside*

```
1       Yui:    um it's a old house- (1.0)
2       Sakura: in countryside?
3       Yui:    =um (1.0) %countryside-% (3.0) relaxed?
4       Sakura: yeah hah, [hah, hah
5       Yui:              [hah, hah, hah
6       (2.0)
7       Sakura: slow life?
8       Yui:    slow life (.) um history?
```

```
9       Sakura: history-
10      Yui:    historical- no (.) um (2.0)
11      Sakura: so who don't like (.) noisy- (1.0)
12      Yui:   um noisy place
13      Sakura: noisy place
14      Yui:    that's why the people come(.) gone to- (.)
15              countryside and (.5) colorless-
16      Sakura: yeah hah, hu, [heh
17      Yui:                  [hah, hah, hah
```

Here, Yui and Sakura use repetition to establish shared keywords like "slow life" (lines 7, 8) and "history" (lines 8, 9). Furthermore, they fluidly supplement each other's thoughts. Yui begins the sentence, "It's a old house-" (line 1), which Sakura completes by asking, "in the countryside?" (line 2). When Yui falters after saying "historical" (line 10), Sakura offers a new line of thought ("so who don't like noisy-" [line 11]). Yui immediately incorporates this suggestion by saying "noisy place" (line 12), which Sakura then confirms through repetition (line 13). This co-constructive sequence is completed by Yui's final, evaluative and concluding term: "colorless" (line 15). As observed by Machi (2020), this kind of varied application of combined strategies such as repetition, collaborative completion, and supplementation is suggestive of highly collaborative interaction.

Planned interaction in Pair 3 (Yui & Sakura). The key divergence of Pair 3 from the primary pattern lies in their approach to the planned condition. Unlike the other pairs who shifted to a parallel style, Yui and Sakura maintained their highly collaborative and co-constructive dynamic in the planned dialogue. Excerpt 13, where they discuss the importance of friends, illustrates this consistency.

Excerpt 13: *Yui & Sakura on friends*

```
1       Yui:    friends (1.0) ok %how important% um (2.0)
2               friends are important to- (3.0) to- (2.0)
3       Sakura: hah, hah, hah
4       Yui:    drinking- (.) playing- (3.0)
5       Sakura: share-
6       Yui:   share the feeling hah, hah, hah
7       Sakura: hah, hah, hah
8       Yui:    yes! (1.0) yes very important
9       Sakura: (2.0) girls need-
10      Yui: talk hah, hah, hah
```

```
11      Sakura: talk hah, hah, hah
12      Yui:    <absolutely yes> (1.0) um (.) yeah=
13      Sakura: =sometimes (.) complaining-
14      Yui:    un.
15      Sakura: un
16      Yui:    yeah, complaining <and> (.) share everything
17              (.) like um yeah (2.0) and how about family?
```

In this exchange, when Sakura says “share” (line 5), Yui immediately repeats and expands on the idea with “share the feeling” (line 6), which Sakura acknowledges with a laugh. This exchange again demonstrates *anticipatory completion*, a pattern consistent with what was observed in the unplanned interaction of Pair 2. Furthermore, Sakura’s “girls need” (line 9) is completed by Yui’s “talk” (line 10), and Sakura then provides a further paraphrase with “complaining” (line 13). Yui then repeats “complaining” (line 16) before summarizing the entire exchange with the recycled phrase, “share everything” (line 16). This second example, the “girls need/talk” exchange, provides a clear illustration of a *collaborative finish*, a specific feature of co-construction. This phenomenon is described by Strauss and Kawanishi (1996) as a process where “both parties intricately and delicately collaborate with each other to co-construct each other’s story to the degree that it is no longer possible to determine who is the primary speaker and who is the interlocutor” (p. 159). Such an interaction transcends a simple exchange of information; it is a dynamic process involving clarification, elaboration, and the negotiation of meaning. This underscores the social and interactive nature of meaning construction within a given communicative context.

In summary, the divergent pattern exhibited by Pair 3 provides a compelling counterpoint to the primary trend observed in the majority of dyads. Unlike the other pairs, who shifted to a parallel style in the planned condition, Pair 3 maintained a highly collaborative and fluid dynamic across both conditions. They consistently displayed features such as frequent short-turn exchanges and the co-construction of ideas, which stood in sharp contrast to the monologic interactions of the other pairs after planning.

DISCUSSION

Primary Pattern: Planning as the Butterfly Effect

Our analysis of dyadic interactions and turn-length trajectories revealed the primary macro-pattern across the majority of pairs. This pattern highlights how pre-task planning, as an initial condition, can significantly influence dyadic dynamics. Specifically, the unplanned interactions were characterized by the collaborative mode with frequent, shorter turns. The planned conversations, in contrast, followed a parallel interaction style that devolved into a series of monologues, as each participant focused simply on delivering their prepared content. This finding, that planning significantly impacts discourse modes, confirms with the previous findings by Nitta and Nakatsuhara (2014).

From the perspective of CDST, this phenomenon can be interpreted as the *butterfly effect*. A seemingly minor difference in the initial condition—the presence or absence of a three-minute planning period—appears to set off a chain reaction. A proposed mechanism for this divergence is that each condition establishes a different initial orientation for the participants. In the unplanned condition, lacking preparation time, participants need to formulate ideas in real-time, resulting in rapid, interdependent exchanges. In the planned condition, however, they are more inclined to deliver their pre-formulated thoughts. Initially distinct orientations become amplified through the iterative process of turn-taking, ultimately resulting in either consistent collaboration or a parallel, monologic mode of discourse.

This divergence in interactional styles is analogous to the distinction between task-oriented (i.e., focused on goal accomplishment) and group maintenance-oriented behaviors (i.e., focused on cohesiveness and socioemotional climate) in group dynamics research (Beebe & Masterson, 2014; also discussed in Poupore, 2018). Applying this framework, the planned condition elicited task-oriented behaviors, as participants focused on the efficient exchange of information through what could be described as more defensive communication with passive listening. In contrast, the unplanned condition fostered group maintenance-oriented behaviors. By focusing on

conversational flow and active listening, participants worked collaboratively to build meaning. They clearly found more enjoyment in this process, feeling a sense of security and comfort in being able to develop ideas with their partner. This finding has significant implications for TBLT research, particularly for cognitive approaches that adopt a task-as-workplan perspective. According to this view, pre-task planning is designed to reduce learners' cognitive load to improve their linguistic performance. Our results, however, reveal a fundamental tension between two dimensions of performance. While planning may enhance the *quantitative* output of information, our micro-level analysis of the *task-in-process* indicates that this may come at the expense of *qualitative* interaction. Specifically, planning might diminish the quality of the dialogue as genuine, collaborative communication.

Deviant case as an Inherent Complexity

The divergent case of Pair 3, who maintained a highly collaborative style across both conditions, serves as a noteworthy exception to the primary pattern. Their consistent orientation toward co-constructing ideas in real-time, characterized by a palpable sense of rapport and genuine enjoyment, can be attributed to two plausible factors. First, Yui and Sakura may possess a relatively high level of interactional competence. While their linguistic competence may not have differed significantly from other pairs, their skillful use of interactional procedures (Kasper & Wagner, 2011), such as turn-taking, sequence organization, and turn-construction, was distinct. This advanced ability to manage dialogue likely enabled them to override the influence of the planning condition and maintain a collaborative stance. Second, the nature of their relationship and the potential for a transfer of their communicative styles in L1 is a likely contributing factor. While all participants were friends, Pair 3 appeared particularly close, which may have fostered a relaxed style that facilitated the transfer of communicative patterns from their L1 (Japanese) to their L2 (English) conversations. Their interaction reflects what Machi (2020) describes as a feature of informal Japanese conversation, where close friends collaboratively develop topics by building

on and completing each other's utterances in a process as if they were "weaving strings into a braid" (p. 16).

The significance of this divergent case is best understood through the lens of CDST. While the primary patterns demonstrate that an initial condition like planning can have a powerful effect on a complex system, the divergent case shows that this influence is not uniform or deterministic. The interactional system is sensitive to countless other factors, including participant relationships, L1 communicative styles, and interactional competence. These factors, which are interconnected, are amplified through the iterative process of turn-taking. From a CDST perspective, this deviant case does not invalidate the findings but rather enriches them. It demonstrates that the initial condition of planning time is only one element within a vast, interconnected network, underscoring the fundamentally complex, dynamic, and non-linear nature of human communication.

CONCLUSION

This study investigated dyadic dynamics through the lens of CDST. Our analysis of sixteen pairs revealed the distinct macro-patterns in their turn-length dynamics and interactional styles. The primary pattern, observed in the majority of dyads, demonstrated the butterfly effect: the seemingly minor difference in the initial condition—the presence or absence of planning time—significantly influenced moment-by-moment communicative choices, leading to divergent emergent discourse patterns. In contrast, the deviant pattern, observed in a minority, was characterized by consistent collaboration across both conditions, suggesting that the initial condition of planning time is influential but not deterministic.

From a methodological perspective, this study underscores the benefit of combining visual inspections of turn-taking trajectories with CA for understanding dyadic dynamics. In contrast to previous studies that often assume a linear relationship between planning and performance, CDST offers a robust framework for

understanding non-linear change through the microgenetic analysis of high-density data points. The advantage of this approach lies in its ability to highlight the importance of iteration. Since turn-taking is an iterative process where each turn builds on the last, repeated opportunities can significantly impact long-term dynamics and lead to the emergence of attractor states in conversational systems.

From a pedagogical standpoint, this study has important implications for how tasks are employed. We find that co-constructive processes in dialogue are profoundly influenced by planning time. Although the dominant pattern suggests that pre-task planning can be counterproductive, our analysis of a deviant case reveals important exceptions. Thus, rather than advocating for a uniform rule, this research highlights the necessity for educators to appreciate how varied initial conditions can shape complex interactional outcomes.

This perspective challenges the conventional assumptions embedded within task design. The traditional view of task-as-workplan assumes a fixed design that should lead to a predictable outcome. However, our findings align with a CDST view of complete connectedness, where all parts of the system are interconnected. From this perspective, a task configuration provides an affordance that enables learners to engage in meaning-making interaction. Learning emerges from the dynamic interplay between learner's performance and perceived affordances. Therefore, tasks should not be seen as tools to force learners into predetermined steps, but rather as a means of creating an environment where they can autonomously use and learn L2 (Nitta & Baba, 2018).

By applying a CDST perspective to dyadic interaction, this study illuminates the intricate and often unpredictable ways in which initial conditions ripple through interactional processes, revealing the subtle yet profound butterfly effects that shape language use and learning. A focused examination of turn-taking trajectories, we argue, is essential for a more nuanced understanding of the complexity of task-based interactions. It is our hope that the framework and findings presented in this paper will contribute to advancing a more dynamic and holistic approach to task-based research.

Authors' Contributions

Ryo Nitta contributed to the conceptual design of the study, was responsible for all data collection, participated in the data analysis, and was a primary author of the manuscript. Fumiyo Nakatsuhara contributed to the study design and participated in data analysis. Both authors were involved in the interpretation of the findings and have given their final approval for publication.

Ethics Approval & Consent to Participate

The study was conducted in accordance with all relevant ethical guidelines for academic research. Formal ethical approval was granted by the institutional review board of Nagoya Gakuin University, where the research was conducted. Prior to data collection, written informed consent was obtained from all participants.

Declaration of GenAI and AI-Assisted Technologies

The authors confirm that no generative AI or AI-assisted technologies were used to generate any part of the study's conceptualization, analysis, interpretation, or original written content. AI-assisted tools were utilized exclusively for the purpose of improving language, grammar, and style. The final manuscript was thoroughly reviewed and edited by the authors, who assume full responsibility for its content.

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APPENDICES

APPENDIX A. Tasks used in This Study

Happiness Task:

- Instruction: Here are some of the things in life which can affect our happiness. First, discuss with your partner how important each of these things is for a happy life. Second, decide which two are the most important.
- The task sheet displayed seven visual items: people conversing animatedly (depicting friendship), an older woman reading with a young girl alongside an older man with a young boy (representing family), several Euro coins (symbolizing wealth), a couple holding hands on a beach at sunset (indicating love/romance), a house with a beautiful garden (suggesting home/security), an abundance of food (denoting sustenance), and a beautiful seaside (representing leisure/nature).

Profession Task:

- Instruction: Here are some pictures of people who are at the top of their professions. First, discuss with your partner how difficult it is to be successful in these professions. Second, decide in which profession it is most difficult to get to the top.
- The task sheet presented eight visual items: a female ballet dancer in a pink tutu, a male artist painting on an easel, a male surgeon, a female singer performing on a stage, a male football player, a male race car driver, a male business person, and a female scientist in a laboratory.

Cafe Task:

- Instruction: Imagine that a local cafe wants to attract more people. Here are some of the suggestions they are considering. First, talk to each other about how important these suggestions might be. Second, decide which two would attract the most people.
- The task sheet displayed seven visual items: three musicians playing instruments (suggesting live music), a sign for “Jon’s Cafe” advertising “1 Free Coffee” (representing a promotion), the exterior of “Jon’s Cafe” at night (indicating ambiance), a menu titled “International Menu” (highlighting diverse food/drink options), a cozy indoor seating area with a sofa, an armchair, and a coffee table (emphasizing comfort), an outdoor seating area for a cafe (offering al fresco dining), and a television screen showing a football game (suggesting entertainment).

Tourists Task:

- Instruction: Here are some photographs of the sorts of places that are popular with tourists. First, talk to each other about why tourists go to places like these. Second, decide which two places might be most damaged by tourism.
- The task sheet displayed seven visual items: a castle in a valley, modern skyscrapers, a summer beach, a small village town, Alpine mountains, pyramids in the desert, and the Louvre Museum featuring the Mona Lisa painting.

APPENDIX B. Transcription Notation (Modified from Atkinson & Heritage, 1984)

Unfilled pauses or gaps	Periods of silence. Micro-pauses (less than .5 second) are shown as (.); longer pauses appear as a time within parentheses. For example (.5) represents five tenths of a second.
Colon (:)	A lengthened sound or syllable; more colons prolong the stretch
Dash (-)	A cut off, usually a glottal stop
.hhh	Inhalation
Hhh	Exhalation
hah, huh, heh	Laughter
(h)	Breathiness within a word
Punctuation	Intonation rather than clausal structure; a full stop (.) is falling intonation, a question mark (?) is rising intonation, a comma (,) is continuing intonation
Equal sign (=)	A latched utterance, no interval between utterances
Open bracket ([ )	Beginning of overlapping utterances

Percent signs (% %)	Quiet talk
Asterisks (* *)	Creaky voice
Empty parentheses ( )	Words within parentheses are doubtful or uncertain
Double parentheses (( ))	Non-vocal action, details of scene
Arrows (><)	The talk speeds up
Arrows (<>)	The talk slows down
Underlining	A word or sound is emphasized
Psk	A lip smack
Tch	A tongue click
Italics	Japanese words
Arrow (→)	A feature of interest to the analyst