"I cut it and I… well now what?": (Un)collaborative Language in Timed Puzzle Games

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Introduction

Language, in its production and reception, allows us to perform collaborative tasks. These tasks may involve language solely, such as the sentencing of a criminal by a judge, or by using language alongside physical actions. In the world of video gaming, particularly in collaborative multiplayer situations wherein a task needs to be completed within a certain amount of time, effective collaborative communication between players is critical.

This chapter presents a small-scale, preliminary study on the use of language between players cooperating to achieve a goal in a time-limited situation. Specifically, this work analyses the use of (un)collaborative language employed between players in the game *Keep Talking and Nobody Explodes* (2015). Linguistic analysis is performed from two different yet complementary perspectives: via Systemic Functional Linguistics (SFL) and Conversation Analysis (CA). Both approaches have strong links regarding the use of language in context, and can analyse interactive elements of communication, but do so from different angles. This approach is taken to show, both quantitatively and qualitatively, a sample of linguistic factors that may contribute to the (un)successful completion of a collaborative task.

If it is assumed that collaborative efforts and communication are precursors to greater task success (i.e. the more people work together to complete a task, the more likely it will be performed successfully, correctly, or on-time; see, e.g., Orasanu and Salas, 1993; Sexton and Helmreich, 2000; and Krifka, Martens and Schwarz, 2004), then it may be argued that certain factors in communication exist that correlate with instances of task success or failure. In other words, certain features in communication may be understood to be ‘collaborative’ (e.g. permitting appropriate time for turn-taking) and ‘uncollaborative’ (e.g. deliberate and frequent interruptions). Nonetheless, given the preliminary nature of such an investigation in video gaming, further study is encouraged.

Literature Review

Language, collaboration, and the impact of stress

Communication between two or more language users can be viewed as a collaborative effort and as a means towards a goal (see, e.g., Sacks, Schegloff and Jefferson, 1974; Halliday, 1978; Halliday and Hasan, 1989; Clark and Wilkes-Gibbs, 1990; Halliday and Matthiessen, 2014). Language users employ different linguistic techniques to achieve whatever this goal may be, regardless of whether said goal is accomplished primarily via language itself (e.g. building interpersonal solidarity between interlocutors when telling a joke; see Fiksdal, 2001), or when language accompanies other actions that are ‘outside’ of language (e.g. when pilots and air traffic control towers communicate; see Garcia, 2013). Arguably, this latter type of collaboration incorporates the former: collaborative tasks that are accompanied by language also require collaboration to occur *within* communication. In other words, to get anything done between two or more people, it is important to ‘get on’ linguistically.

Halliday and Matthiessen (2014: 33) refer to communicative instances as “socio-semiotic activities,” which span “from contexts where language does all the semiotic work to contexts where all the semiotic work is done by some semiotic system or systems other than language” (2014: 38). For instance, when two employees of a removal company are working to manoeuvre a sofa through a small stairwell, they will communicate with one another to be aware of aspects such as weight distribution and potential obstacles. Depending on the size of the sofa and the complexity of the stairwell, other people may also be involved in communication to ensure, for example, that no damage is done to property, or that they are approaching a step or a large potted plant. As such, the successful completion of this task requires both physical and linguistic collaboration, and is classed as the socio-semiotic activity of 'doing.' Considering further socio-semiotic activities such as 'narrating' and 'advising' (see Halliday and Matthiessen, 2014: 37), it may be argued that all communication can be viewed as some form of collaborative task. While the above instance of moving a sofa presents a more physical and 'overt' task, the small talk used between two employees in a taxi can be viewed as the completion of a more social task, albeit still an instance of collaboration (i.e. maintaining cordial relationships; see Coupland, 2003). Nonetheless, it is the area of 'doing' that is focused on in this chapter.

A further point to note is that each of the above examples can be viewed as relatively stress-free, if stress is understood as a negative emotional response from a stimulus, which may manifest physically or verbally (see the 'stressor-strain' approach exemplified in Beehr and Franz, 1987). While there are aspects that may increase stress levels in the above examples (e.g. the possibility of job loss if the furniture or walls are damaged), they may be viewed as less stressful than other situations. If the examples noted above are compared to a surgeon in an operating theatre who has minutes to successfully revive a patient and must rely on (amongst other things) successful communication with her team to complete the task, factors including the increased pressure due to timing, the heightened risk to life, and the potential complications that may arise, would heighten stress levels considerably. Given that stress can manifest verbally (Jaffe and Feldstein, 1970), communication will likely be affected in such situations.

There is a small but informative body of literature concerning the intersection of language, collaboration and stress. Sexton and Helmreich (2000) observe collaborative language within interactions between flight crew members during simulations consisting of low and high workload tasks. While Sexton and Helmreich identify that language use is one of many factors contributing to successful flights, they note that there are "links between pilot language use and flight outcome" (2000: 66). Statistical analyses performed on the language data allow the authors to posit various conclusions, such as the correlation between the use of larger words (defined by Sexton and Helmreich as words containing more than six letters) and reduced task performance: "those individuals who expend the cognitive resources necessary to speak more elaborately (using bigger words) do so at the expense of decreased situational awareness" (ibid.).

Khawaja, Chen and Marcus (2012) also observe linguistic variation in collaborative tasks, namely the language of an incident management team working together to solve simulated bushfires. The authors analyse relationships between cognitive load and language, presenting comparisons between language when cognitive load is low – when "participants were involved in communication not related to their task, for example, conversation about personal life" (2012: 523) – and when cognitive load is high – when "participants were involved in challenging tasks, for example, handling unexpected events, producing information reports, and completing tasks within time constraints" (ibid.). Khawaja, Chen and Marcus, present numerous conclusions, including: more speech is used during tasks with a high cognitive load (calculated by the difference in the number of words used between tasks); complex tasks result in greater collaboration and coordination (derived from the more frequent use of the plural pronoun 'we' in high cognitive load tasks); and disagreements are more common during stressful tasks (derived from the number of 'disagreement words' employed between the different tasks, although such words are not overtly reported in the findings). However, the analysis provided by Khawaja, Chen and Marcus (2012) requires caution. The utterances appear to be subjectively coded depending on task load, and the authors note that these codings had an initial interrater reliability score of 72%, which later increased to 83% after coders "discussed further the points of difference" (2012: 523). Although the statistical test regarding interrater reliability is not mentioned (e.g. Cohen's Kappa or Krippendorff's Alpha), both percentages imply that between one-quarter and one-fifth of codings were not agreed on. While issues persist surrounding the arbitrariness of 'acceptable' percentages (see, e.g., McHugh, 2012: 279), the calculated values suggest that further investigation into this data could be useful.

More recently, in McKendrick et al.'s (2014) study into collaboration in simulated environments with unmanned aerial vehicles, similar results to those mentioned in the above studies are found. For example, "an increase in words used per message was associated negatively with task performance" (2014: 472). However, McKendrick et al.'s approach to this area of study, alongside the approaches of Sexton and Helmreich (2000) and Khawaja, Chen and Marcus (2012), contain a notable omission: while each study claims to focus on 'linguistic cues,' the relationship to linguistic theory is often disregarded. Each of these investigations rely to some extent on counting words, calculating word lengths, or assigning words to subjective categories, without considering deeper linguistic principles. For instance, McKendrick et al. (2014: 465) associate the number of words produced as a measure "of communication frequency and complexity," while overlooking other linguistic features that may also play a part in task collaboration.

Although such a critique is not intended to dismiss the results presented in these works, it does suggest that approaches to the analysis of language employed during collaborative interactions can be enhanced. Krifka, Martens and Schwarz (2004) address this point in their work, applying a more in-depth linguistic analysis to a subset of data from Sexton and Helmreich (2000). By applying and adapting Searle's (1975) speech act theory, Krifka, Martens and Schwarz (2004) note that successful simulations correlate with, among other things, a heightened use of speech acts that are positive in their nature, and that seek support from other team members. Conversely, speech acts related to opposition and re-establishing known facts correlate with poor outcomes. Moreover, Nevile's (2001) study on the collaborative language of air traffic controllers and pilots (commented and expanded on by Garcia, 2013) analyses language via Conversation Analysis. In doing so, Nevile identifies further linguistic and interactional elements that are conducive to collaborative communication, such as the use of short, succinct turns.

The above studies analyse collaborative language to varying extents, and (with the exception of Nevile's work) focus on simulated environments with varying levels of stress. Although simulations may have parallels to video games (e.g. the requirement for successful task completion to advance, pre-programmed events, etc.), they are not video games *per se*. Interaction in collaborative gaming environments has been researched to varying extents, yet there remains the opportunity for the language used in these environments to be explored and analysed in greater detail. For instance, Egenfeldt-Nielsen, Smith & Tosca (2016) identify that the language employed in gameplay has the ability to enhance social cohesion, but they do not present a detailed linguistic analysis to support this statement. Similarly, Ducheneaut and Moore (2004) observe the social side of gaming and interaction patterns in online social settings, but no in-depth analysis of language occurs.

Interestingly, Taylor (2009: 38) notes that "the importance of linking design with the social life of a game cannot be overemphasized," with this linkage being facilitated via language. It is here that a divide may be drawn between studies that observe communication to build and sustain social elements (i.e. Halliday's socio-semiotic activities of 'sharing,' 'reporting,' etc.), and communication within games that *works alongside* the completion of another, 'extra-linguistic' task (i.e. Halliday's socio-semiotic activity of 'doing'). Prior to investigating this point further, however, a short review of how linguistic analysis could be performed in these environments is presented.

Analysing collaboration in communication

As evidenced by the range of sub-disciplines in linguistics and the many convergent and divergent theories found therein, the potential for linguistic analysis is vast. Nonetheless, certain theories are more ‘suitable’ in their applications to linguistic analysis than others, including the analysis of collaborative gameplay. The approaches presented here are Systemic Functional Linguistics (SFL) and Conversation Analysis (CA), chosen for their applicability to analysing language in action, and their recognition of the importance of context in interaction.

The theoretical groundings of SFL and CA are such that there are similarities in their approaches and epistemic positioning. SFL understands language as a ‘social semiotic,’ with roots in the Firthian concept of context of situation (Firth, 1935) and how language use varies according to environment. Language and context are also understood to act in a dialogic manner (see, e.g., Hasan, 2014), influencing and ‘constructing’ one another. Likewise, CA developed with strong influence from Garfinkel’s (1967: vii) ethnomethodology, which noted a complementary phenomenon: communicators understand a context and then employ language that reinforces that context. Both SFL and CA therefore promote the importance of context in linguistic analysis, and that any communications have analysable elements that can be explored in further detail. There are similarities in their philosophical positioning, yet they are distinct in their approaches, which are explained briefly below.

Systemic Functional Linguistics (SFL). SFL is a broad, functional approach to the description and analysis of language (Butler, 2003). The theories it presents are in-depth and numerous, such that a full account of SFL cannot be provided here (see, e.g., Halliday and Matthiessen, 2014, and Thompson, 2014, for more information). Nonetheless, a fundamental idea of SFL is that language produces several strands of meaning simultaneously, known as metafunctions. These are: ideational, or how experience is represented and logically organised in language; textual, or how a text develops over time; and interpersonal, or how social relationships are enacted and maintained through language. It is this final metafunction that is focused on in this chapter.

The observation of the three Hallidayan metafunctions is performed at clause level: the occurrence and order of certain functional elements within a clause go towards explaining the meanings that are expressed. Focusing on the interpersonal area of meaning in English, the key functional elements are the Subject – "the entity […] that the speaker wants to make responsible for the validity of the proposition being advanced in the clause" (Thompson, 2014: 55) – and the Finite – the element that "makes it possible to argue about the validity of the proposition" (ibid.). These elements allow for an interpersonal 'move' to be made by the speaker. For instance, when the speaker wishes to provide information, such as 'he is young,' the Subject (he) is followed by the Finite (is). Conversely, in requesting clarification, the Subject and Finite are inverted, thereby creating 'is he young?' Other configurations are possible, such as the removal of the Subject to create a command: '(you) look at this!'

While interpersonal elements present far more complexity in English than what is demonstrated above (see, e.g., Chapter 4 of Halliday and Matthiessen, 2014), with similar levels of complexity across languages (Caffarel, Martin and Matthiessen, 2004), even the identification of the Subject and the Finite alone allows for linguistic analysis from the perspective of social interaction to occur. The configuration of Subject and Finite result in the use of different clause types in communication (and therefore the different kinds of interpersonal moves made between communicators), thereby presenting insights into social elements of language, including but not limited to areas such as collaboration. This has been observed in previous work (e.g. Jacobs and Ward, 2000), and is explored in greater depth later in this chapter.

Conversation Analysis (CA). CA (Sacks, Schegloff and Jefferson, 1974) is an approach that understands the use of language as action within socio-cultural contexts, due in part to influence from ethnomethodology (Garfinkel, 1967). Similarly to SFL, the interaction between context and language is imbued with high importance: “CA offers an alternative to the view […] that our conduct automatically reflects the context in which it occurs” (Woofit, 2005: 69). However, rather than focusing on the clause as a unit of analysis, CA observes “the properties of the ways in which interaction proceeds through activities produced through successive turns” (2005: 8). CA therefore permits the analysis of data that may be ‘omitted’ in SFL by observing the “ostensibly ‘minor’ contributions and non-lexical items [that] may be interactionally significant” (2005: 12).

In ten Have’s (2007) words, there is a distinction between ‘pure CA’ and ‘applied CA,’ primarily defined by their scope: pure CA is concerned with the elements of interaction when ‘interaction’ is understood as an intrinsic phenomenon, whereas applied CA extends towards the observation of interaction within specific contexts. Put another way, pure CA is used to understand the general strategies employed in interaction across contexts, but in applied CA, “the scope of one’s findings will often be intentionally limited to a specific setting or interaction type” (2007: 147). As such, using CA to analyse interaction in the context of collaboration in multiplayer gaming may be understood as ‘applied.’

Whether pure or applied in scope, the same underlying principles of CA are generally observed. The primary principle is that any conversation is split into sequences of turns, and as Sacks, Schegloff and Jefferson (1974: 730) note, “one party talks at a time.” Furthermore, while no two conversations are completely identical, turn-taking in conversation has an overall systematic development and usage. As such, there are similar elements in any conversation that can be analysed, including overlaps in communication, interruptions, repair, and pausing (see, e.g., Liddicoat, 2007 and ten Have, 2007).

As seen in some of the studies mentioned in the literature review, the application of CA to various communicative situations can produce noteworthy results. When combined with the applicability of SFL in observing the interpersonal strategies realised in language, alongside the opportunity to explore collaborative language in video games in greater detail, the following questions may be proposed: when considering the outcome (i.e. successful vs. unsuccessful) of collaborative tasks that involve a certain level of stress and that require collaborative communication, are there specific linguistic patterns that can be found? If so, what may be observed at clause level (i.e. via SFL) and at the level of the turn (i.e. via CA)?

Methodology

To investigate the language of collaboration, an experiment was set up to record the vocal interactions of a group of participants playing the video game *Keep Talking and Nobody Explodes* (2015). According to the developers, this game began as a rough contribution to the 2014 Global Game Jam – an event wherein game developers work together around a theme. However, its popularity during this event would be the precursor to its success, eventually being developed for Windows, OS X, Linux, and various VR platforms.

The game requires a minimum of two players to work co-operatively using spoken communication to defuse a timed bomb by successfully disarming different modules (i.e. completing short tasks, such as cutting a specific wire, or pressing buttons in a certain order). To successfully defuse the bomb, one player – the 'defuser' – listens to the instructions given from another player or players – the 'expert(s).' However, the defuser may only see the bomb, and the expert(s) may only see the instructions. As there is also a variable time-limit assigned to each bomb, each scenario comprises numerous stressors. In order to enhance the chances of successful task completion, effective and collaborative communication must be used.

Five participants were recruited to take part in a series of rounds, and these participants were chosen based on several factors. Firstly, each participant confirmed that their production and comprehension of spoken and written English was suitable for the task (i.e. they were native English speakers or had at least a C1 level of English according to the CEFR scale; see Council of Europe, 2001). Secondly, the participants were briefly asked about their previous experiences with video games and technology, to ensure that they could easily understand the game mechanics and how to interact both with the bomb (as defuser). Finally, it was confirmed that each participant had little to no previous exposure to *Keep Talking and Nobody Explodes* (2015) to ensure a similar ability level across the sample.

The five participants were introduced to each other prior to gameplay to become acquainted. A demonstration of the first level was also provided, allowing players to understand how to interact with the interface (i.e. point and click via a mouse), and for any queries to be answered. Furthermore, the demonstration confirmed how players were not permitted to look at what the other player could see, which was reinforced by the configuration of the players during gameplay: players sat at opposite ends of a table with an opaque screen in the middle. This configuration allowed for easy verbal communication while ensuring both that players saw only what they were permitted to see, and that non-verbal signals were removed from communication. A schematisation of this setup can be seen in Figure 1.

[Figure 1 here – A side-view of the experimental setup.]

Rounds were organised so that each player worked with all other players once. This resulted in ten rounds, with each player having two rounds as the defuser and two rounds as the expert. The organisation of participants per round is shown in Table 1, with the final column identifying if the round was successful (i.e. the bomb was defused before time elapsed) or unsuccessful (i.e. the bomb exploded due to either three incorrect moves or because time elapsed). In total, six rounds were successful, and each participant was part of a successful and unsuccessful round at least once.

Table 1 - The organisation of participants in the ten rounds played.

Round	**Players**		**Round result**
	Defuser	*Expert*	
1	1	2	Exploded
2	3	1	Defused
3	1	4	Defused
4	5	1	Defused
5	2	3	Defused
6	4	2	Exploded
7	2	5	Defused
8	3	4	Defused
9	5	3	Exploded
10	4	5	Exploded

Each round had the same level of difficulty, requiring four modules to be defused in three minutes. However, each bomb was unique in its composition: no two configurations of modules were the same, and non-interactive parts of the bomb (e.g. the serial number, and the number of LEDs and batteries, which all contribute to correct defusing) were randomised. As such, each round was unique, allowing for a moderate level of challenge and ensuring that any 'previous answers' could not be used in to subsequent rounds.

In each round, screen capture software recorded the display showing the bomb, which was time-aligned with an audio recording of the two players verbally interacting. The audio was recorded using a microphone placed on top of the opaque screen separating the players, set in a bidirectional recording mode (i.e. configured to 'focus' on the voices of the participants sitting opposite from one another, rather than other noises). Although only the audio was transcribed, the screen capture allowed for greater clarity in cases where the defuser used various deictic words. For instance, if the defuser said 'I don't know what this is' while moving the cursor over a button, the screen capture clarified the intended referent.

Data were transcribed and analysed via SFL and CA. The former required the identification of clause types (e.g. declarative, interrogative, etc.) and clause composition, whereas the latter looked at conversational elements including turns, pauses, and interruption.

Findings and discussion

The Systemic Functional perspective

This study analysed language in a similar method to that of Eggins (2004): clauses were identified and counted based on their function and composition. For this study, these counts were then further split based on whether the round was successful or unsuccessful. These totals are tabulated in Table 2 below, and also represented in a chart format in Figure 2:

Table 2. Number of Clauses Used (with Mean Values per Round in Parentheses) Split by Task Success

Clause type	**Task success**			
	Successful		*Unsuccessful*	
Full declarative	119	(19.83)	69	(17.25)
Elliptical declarative	73	(12.17)	62	(15.50)
Full polar interrogative	37	(6.17)	19	(4.75)
Elliptical polar interrogative	18	(3.00)	27	(6.75)
Full WH-interrogative	17	(2.83)	14	(3.50)
Elliptical WH-interrogative	5	(0.83)	10	(2.50)
Imperative	79	(13.17)	55	(13.75)
Minor	37	(6.17)	21	(5.25)
Abandoned	18	(3.00)	29	(7.25)
Total	*484*		*469*	

[Figure 2 here – Mean values of clauses used per round, split for task success.]

The ‘clause types’ in Table 2 are defined as follows. Full clauses contain all the mandatory clausal elements to be deemed ‘complete:’

- a full declarative contains the Subject and Finite in that order (e.g. ‘<u>I have</u> cut it’);
- a full polar interrogative contains the Subject and Finite in reverse order (e.g. ‘<u>Have you</u> cut it?’); and
- a full WH-interrogative contains a wh- question particle with a Finite element (e.g. ‘<u>Who cut</u> it?’).

Conversely, elliptical clauses omit one or more of these mandatory elements but are nonetheless understood to be an interpersonal move in the dialogue:

- an elliptical declarative may be a short response to a question (e.g. responding to "Which one did you cut?" with "Red");
- an elliptical polar interrogative may use intonation to differentiate it from an imperative clause (e.g. 'Cut it?' with rising intonation); and
- an elliptical WH-interrogative may only contain the wh- question particle (e.g. "Which?").

Imperative clauses omit the Subject and have the force of 'commanding' the recipient of the message (e.g. 'Cut it' with falling intonation, to differentiate it from an elliptical polar clause). Minor clauses contain neither Subject nor Finite elements, but are still interpreted as interpersonal moves (e.g. exclamations and alarms such as 'Oh!'), and abandoned clauses are those that are started but not completed due to interruption from another source or the speaker themselves (e.g. 'You should probably…").

Despite the small sample size of this study, inferential statistical analyses (two-sample t-tests) were performed to identify statistically significant trends with regards to clause occurrence. While differences are already apparent in the 'Task success' sub-columns of Table 2 and in the chart area of Figure 2, there were three statistically significant differences calculated. Firstly, the number of elliptical polar clauses used in successful rounds ($M = 3.00$, $SD = 1.41$) compared to the number found in unsuccessful rounds ($M = 6.75$, $SD = 2.63$) was significantly different ($t = 2.96, p < 0.02$). Secondly, the difference in number of elliptical WH-interrogative clauses observed in successful rounds ($M = 0.83$, $SD = 0.98$) compared to those used in unsuccessful rounds ($M = 2.50$, $SD = 0.58$) was calculated at a similar level of significance ($t = 3.02$, $p < 0.02$). Finally, the difference in instances of abandoned clauses in successful rounds ($M = 3.00$, $SD = 0.63$) in comparison with those observed in unsuccessful rounds (*M* = 7.25, *SD* = 1.26) was calculated to be highly significant ($t = 7.17$, $p < 0.001$). In all three cases, these clause types occurred more in unsuccessful rounds.

Some initial suggestions may be posited for this patterning, with the difference between these suggestions being a matter of 'direction:' the use of particular clause-types (i.e. elliptical polar, elliptical WH-interrogative and abandoned clauses) contributed towards the round being unsuccessful; the unsuccessfulness of the round resulted in the occurrence of these clause-types; or a 'downward spiral' effect occurred wherein the use of these structures increased the likelihood of being unsuccessful, thereby creating more opportunities for these clause-types to occur. Therefore, it is necessary to more closely observe these clauses types in context to understand whether they were a contribution towards, a result of, or a self-fulfilling consequence of, unsuccessful rounds.

Concerning abandoned clauses, while not unexpected in spontaneous spoken language (see Eggins, 2004), there was a prominent pattern in their usage during unsuccessful rounds. Of the total 29 instances, 24 – roughly 83% of the total – were used once there was at least one 'strike' on the bomb (i.e. when at least one wrong move had been made). Each bomb had a tolerance for two incorrect moves, known as strikes, with a third leading to explosion. Furthermore, the countdown rate increased by roughly 1.25% for one strike and 1.50% for two strikes, arguably increasing stress levels as the task needed to be completed in a shorter time. This may therefore manifest as abandoned structures, as seen in the following example from Round 1 (note that the use of ellipses (…) indicate a pause of 0.6 seconds or longer):

Round 1 - Player 1 (defuser) and Player 2 (expert)

(Player 1 clicks an incorrect button and receives the first 'strike' on the bomb.)

Player 1 - That was wrong and it's counting down quicker.

Player 2 - Okay so you need to… Okay oh god. Do you have a… Wait.

Player 1 - What do I do?

The above extract is from the first game, suggesting that it was the first time that either player had played the game. In this instance, the module required players to press coloured buttons in a certain sequence, but the sequence altered depending on the number of strikes obtained. This confused Player 2, leading to two abandoned clauses and the requirement for Player 1 to then use an interrogative clause to clarify the next steps. Following this exchange, there was a silence of roughly 10 seconds while Player 2 tried to advise on the correct sequence, but subsequent attempts to defuse the module were performed incorrectly, causing the bomb to explode and classifying the round as unsuccessful.

Another instance of abandoned clauses can be seen below from Round 10:

Round 10 - Player 4 (defuser) and Player 5 (instructor)

(Player 4 selects the wrong wire and receives their second 'strike' on the bomb.)

Player 4 - No that wasn't it.

Player 5 - Really? Did you cut the…

Player 4 - I cut it and I… well now what?

Player 5 - Cut the other one and move to…

Player 4 - Which other one?

Unlike the extract from Round 1, this was the final round of the session, and therefore each players' fourth attempt at the game. While both players were more aware of how to complete the module in question (cutting coloured wires), prior miscommunication had occurred: Player 4 incorrectly stated the number and colour of wires in the module, causing Player 5 to provide the wrong answer, and for Player 5 to assume that only one wire was left to cut. As such, Player 5 asked for clarification, followed by a partial response from Player 4, and then a further partial command from Player 5. Importantly, these instances were not abandoned due to interruption from the other player, and this effect is discussed from a CA perspective in the following section.

Abandoned structures also appeared in successful rounds, albeit infrequently, and they mostly appeared as faults due to the expert misreading or misinterpreting the instructions. Often, the expert would realise the error, stop, and reformulate the utterance, as exemplified below from Round 2:

Round 2 - Player 3 (defuser) and Player 1 (expert)

Player 3 - I can see a bunch of wires.

(Player 1 searches through the instructions for roughly 7 seconds)

Player 1 - Right, do you see all… sorry. How many wires do you see?

Regarding elliptical polar and WH-interrogative clauses, these appeared to be used in various stages of unsuccessful rounds, unlike abandoned clauses that commonly appeared after strikes were made. For these elliptical clauses, the trend was for further clarification to be required after their use, therefore delaying progress. This can be seen in the following extracts from Round 6 and Round 9:

Round 6 - Player 4 (defuser) and Player 2 (expert)

Player 2	-	Hold the button and tell me the colour.
Player 4	-	Which?
Player 2	-	The button that says 'hold.'
Player 4	-	I mean which colour do you want: the button or the light?

Round 9 - Player 5 (defuser) and Player 3 (expert)

Player 3	-	Select the wire to cut it.
Player 5	-	What?
Player 3	-	Click on the correct wire to cut it.
Player 5	-	Yeah I get that but which colour is the correct wire?

In both instances, the use of a single interrogative particle by the defuser results in ambiguity. The expert interprets each response, but fails to respond in the way that the defuser expects, requiring further clarification to rectify confusion.

It may also be suggested that the use of elliptical interrogative clauses is self-fulfilling: if a player wishes to save time by assuming shared understanding of certain elements, they may reduce the elements of an utterance to a minimum by use of ellipsis (Halliday and Hasan, 1976). This, however, increases the potential level of ambiguity. As such, additional utterances may have to be used, thus requiring more time. It is suspected that given more practice and exposure to the tasks, the use of elliptical structures would produce less ambiguity as players would know 'key elements' to save time. However, until a higher level of proficiency with the tasks is reached, full clauses appear necessary, even though they take marginally longer to produce. The use of elliptical and abandoned clauses, then, seems to show a downwards spiral, at least at a novice level.

The Conversation Analysis Perspective

As noted in various CA works (e.g. ten Have, 2007), there is no 'correct' method to analysing texts from the CA perspective. However, a trend between most CA analyses is that the starting point seems to be without a specific or deliberate point of linguistic interest. In other words, these analyses are "not prompted by prespecified analytic goals [. . .] but by 'noticings' of initially unremarkable features of talk" (Schegloff, 1996: 172). Reading through the transcribed data allowed for these 'noticings' and patterns of occurrences in the data, which appear to correlate within and between (un)successful interactions.

The first area of interest concerns effects within a basic unit of discourse: the adjacency pair. At its most simplistic, Schegloff (2007) notes that an adjacency pair form two parts, the first of which initiates (first pair parts; FPPs) and the second of which responds (second pair parts; SPPs). In everyday speech, there may be items leading up to, separating, or following the FPP and the SPP (i.e. expansions), but the notion of initiation and appropriate response allows for communication to progress in a collaborative manner.

In Rounds 6 and 9 (both unsuccessful), several instances were observed where an FPP was presented, along with expansions, yet an SPP did not occur. An extract from Round 6 is presented below wherein the defuser recommends a module to begin with, but then changes their mind (notation conventions are explained at the end of this chapter):

Round 6 - Player 4 (defuser) and Player 2 (expert)

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1     Player 4  I have six wires s let's do wires [there] is
2     Player 2                                    [oka:y]
3     Player 4  i:[s six w]ires
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4 Player 2 [ju just] wires?

5 Player 4 y:es=

6 Player 2 =okay blues?

Player 4 looks at other modules (1.2)

7 Player 2 Do you have a[ny blues]

8 Player 4 [yeah yea]h just gimme a [momen]

9 Player 2 [but y]ou

10 need to (0.4) t tell m[e how m]--

11 Player 4 [should]we <u>change</u> mods

In line 4, Player 2 asks a question and immediately receives a response from Player 4 (i.e. a minimal adjacency pair is formed). However, when another question is asked by Player 2 in line 6, no response is provided despite the use of 'yeah yeah' by Player 4 in line 8, which appear to be used in a dismissive manner. As such, the FPP is not paired with an SPP. In fact, line 11 shows Player 4 invoking another FPP to steer the conversation, and the task focus, into a different area.

Pauses and silences were also noted to show interesting effects. For some modules, the information required by the expert would only appear intermittently. In the case of the following extract from Round 1, the module in question flashes a colour or sequence of colours every few seconds:

Round 1 – Player 1 (defuser) and Player 2 (expert)

1 Player 1 The first is red.

2 Player 2 Okay okay (0.8) so: red ↑i:s blue=

3 Player 1 =blue okay?

Player 1 clicks button and waits for next sequence (2.6)

4 Player 2 okay?=

5 Player 1 =okay the colour is blue=

6 Player 2 =blue is red.

7 Player 1 °oka.

Player 1 clicks button and waits for next sequence (3.5)

8 Player 2 .hh hello the next o[ne]

9 Player 1 [gr]een gr green sorry I ha

10 °to °t-- it's green (0.3) .hh green

In this instance, Player 2 was not aware that Player 1 was waiting for the next colour to appear, resulting in short but perceptible periods of silence. Player 2, however, is conscious of the limited time, and so in lines 4 and 8 tries to re-engage Player 1 (despite Player 1 already being fully engaged). Previous studies have noted that situations evoking higher levels of stress usually result in shorter silences between turns (see, e.g., Jaffe and Feldstein, 1970), and it appears that Player 2 follows this pattern, viewing extended silences as halts in communication and a threat to successful task completion. Nonetheless, the silences were necessary to successfully complete this task.

Conversely, in Round 8, silence is viewed in a different way between the players, when completing a module consisting of four buttons with symbols that needed pressing in a specific order:

Round 8 - Player 3 (defuser) and Player 4 (expert)

```
1    Player 4  you should ha:ve symbols in front o[f you]
2    Player 3                                    [yep I] can
3              see four symbols=
4    Player 4                 =great. what do they look like.
5    Player 3  er:m .hh okay there's a backwards L (0.4) a: W
6              thing (0.5) copyright symbol and then star.
```

Player 4 looks over possible combinations (5.2)

```
7    Player 4  o::kay got it (0.4) click on copyright the:n W
8              thing then L thing then star
```

Player 3 selects the buttons in the order given (1.6)

```
9    Player 3  okay done brill[iant]
10   Player 4                 [yes:] nice one
```

The number of silences seen in the above extract reflects a common pattern seen throughout successful rounds. Unlike the extract from Round 1, the silences between turns (notably from line 5 to line 9) allowed the players to perform the necessary steps to successfully complete the module and, eventually, defuse the bomb. Although the bomb was counting down at the same rate as that of the extract from Round 1, a ‘calmer’ approach that allowed for silences was common in successful rounds. This echoes what was noted by Sexton and Helmreich (2000): superfluous speech is understood to impede task success, so understanding these ‘longer’ pauses as necessary for tasks to be completed rather than instances to be filled with extra linguistic information appear to increase the likelihood of successful task completion.

In addition, the above extract from Round 8 shows little crosstalk and interruption. A further distinction between successful rounds and unsuccessful rounds may be observed when considering interruption, as exemplified below in Round 10:

Round 10 – Player 4 (defuser) and Player 5 (expert)

1	Player 4	so there’s a number with four numbers below it.
2	Player 5	ri:ght so what do[es the fir]--
3	Player 4	[and the bi]g one is a two=
4	Player 5	=I I
5		was about to a:sk y[ou that so y]--
6	Player 4	[yeah it’s a]tw a tw[o]
7	Player 5	[a] two
8		right?
	(4.6)	
9	Player 4	so: what now.
10	Player 5	<u>well</u> is it a two o[r not]
11	Player 4	[yes y]es it's a two=

```
Player 5                                      =okay er:
            so you nee:d to pr[ess]--
Player 4                  [yea]h press which one time's
            running out
```

In the above extract, there are multiple overlaps and interruptions observed, creating an impasse after line 8: Player 5 wishes to know the response to their question which is asked (partially or fully) in lines 2, 7 and 8, and despite Player 4 giving this information in lines 3 and 6, Player 2 still desired clarification. As such, after line 8, Player 4 is expecting the next instruction, while Player 5 awaits clarification. After nearly 5 seconds, Player 4 breaks the silence and tries to resolve the issue. However, the issue persists in the remainder of the extract, including Player 4's interruption and more forceful expression of 'which one' in line 14.

This brief CA analysis suggests that there are conversational patterns in (un)successful rounds. Firstly, there was a higher likelihood of success when adjacency pairs were completed appropriately (see Schegloff, 2007), regardless of any expansions that were added before, in-between, or after the pair. Secondly, allowing for periods of silence between turns correlated with more successful rounds. If these were interrupted by a repeated request, this resulted in wasted time and a generally more 'panicked' approach. Finally, when players allowed each other to complete their turns with little or no interruption, there was greater task success. Of course, no interaction was free of interruption or cross-talk – as is the nature of spoken language (Heldner and Edlund, 2010) – but there were far fewer occurrences of these in successful rounds.

Conclusions and further study

In video games such as *Keep Talking and Nobody Explodes* (2015), there is no choice but for players to collaborate effectively if they wish to be successful. Given the added constraint of being able to view only half of the overall information, and the addition of a variable time limit, the reliance on effective verbal communication increases dramatically. Such environments are not unlike other 'real world' environments (e.g. air traffic control; see Nevile, 2001), although the consequences of miscommunication in each differ markedly.

From this preliminary (albeit limited) study, several linguistic features may be suggested as markers of collaborative language, if collaboration is understood to correlate with successful task completion. From an SFL perspective, the use of 'full' clauses (as opposed to elliptical and abandoned clauses) have a stronger association with successful task completion. From a CA perspective, the completion of adjacency pairs, allowing for pauses between turns, and fewer interruptions were all observed more frequently in successful rounds. Overall, despite a mixture of a short time limit, penalties for incorrect responses, and deliberate difficulty in collaboration, success occurred when time was taken over communication and the relative 'stress' of the situation was ignored (cf. Jaffe and Feldstein, 1970). The language of collaboration therefore appears to be at its most effective when ambiguity is low and when turns are taken in a logical and non-overlapping manner. When clauses were elided and/or abandoned, and periods of silence were viewed as detrimental rather than necessary, the likelihood of success dropped, suggesting that these features are uncollaborative.

Nonetheless, there are likely other elements within communication that 'fly under the radar' of both SFL and CA analyses. For instance, questions may be posed regarding the balance of power in these interactions, such as in Round 1 wherein Player 1 uses quieter speech and apologies, while Player 2 appears to 'dominate' with louder speech and commands.[1]

[1] It is noted (e.g. Fairclough, 1995:23) that CA is not suited to, or indeed "resistant to linking properties of talk with higher-level features of society and culture [including] relations of power." However, Hutchby (1999) contends this fact in his various works. As such, observing power relations via CA should not be completely dismissed.

Observations of other collaborative games with specific short tasks and time limits, or games with longer tasks wherein in-depth strategies are required, would also be beneficial to observe and compare with the findings presented in this chapter. However, it will need to be borne in mind that collaborative games may use text chat rather than vocal chat, adding another level of complexity into turn-taking in these environments.

Furthermore, recorded play-throughs of modified versions of *Keep Talking and Nobody Explodes* are accessible on various websites, wherein multiple experts assist one defuser to disarm bombs consisting of numerous high-difficulty modules in 10 minutes. Analysing the complexity of such multiplayer communication would undoubtedly prove interesting, and more extensive studies will be needed to further corroborate, qualify, and/or finesse the observations made in this study.

Notation conventions

[and]	-	points where speech overlap begin and end
=	-	speech between participants without a gap
.	-	silence of less than 0.3 seconds
(0.0)	-	amount of silence in seconds
?	-	rising intonation (not necessarily a question)
:	-	extension of preceding phoneme
--	-	location of abandoned clause
.hh	-	audible exhalation
<u>underlined</u>	-	word(s) pronounced noticeably more forcefully
°	-	following word pronounced noticeably less forcefully

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