

A Glimpse into Intra-individual Oral Performance in a Semester-long Audio Journal

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Abstract

This paper provides an initial, experimental look into the language development of an EFL university student by means of both quantitative and qualitative analyses of intra-individual variability in oral performance in a semester-long online audio journal. As dynamic systems theory has become a prevalent framework in the literature in recent years, the question of how best to go about applying this promising theory to language development has arisen. This paper is an attempt to apply the ideas offered by Larsen-Freeman (2006) in a deeper look into the development of the language system of an individual learner. Using a semester-long series of learner self-recorded online audio journals, quantitative analysis of utterances as well as qualitative analysis of emergent idea units was attempted. Initial quantitative findings displayed an overall increase in fluency, as measured by words per utterance, and the use of compound sentences, despite an overall decrease in accuracy. Qualitative findings included a change from more reporting-type language to the use of more personalized and affective elements.

Key Words: dynamic systems theory, language development, variability, oral performance

If you have read any research from the field of applied linguistics from the past decade or so, chances are good you have come across the terms *dynamic(al) systems theory* or *complex systems*. Since a smattering of articles published in the 1990s (e.g. Larsen-Freeman 1997; Mohanan 1992; Van Geert 1991), dynamic systems theory (DST) has begun to really shake things up in how we view language acquisition and development (de Bot, Lowie, & Verspoor 2005; Dörnyei 2009; The Five Graces Group 2009; Larsen-Freeman & Cameron 2008; Verspoor, Lowie, & van Dijk 2008). Initially developed in mathematics for use in artificial intelligence and cybernetics (Holland 1998), DST has transformed the fields of meteorology (Lorenz 1963), history (Gaddis 2002), and social science (Byrne 1998), and even reached as far as economics, epidemiology, and neurology. At this point, it is probably safe to say that DST is here to stay.

How best to go about applying such a powerful and universal theory to language development is not so straightforward, however. In the past 10 years or so, the first real research into the complex system of the language learner has begun to emerge in the field.¹ Still, there is some way to go before it is clear how best to incorporate DST into an established research paradigm. This paper is a small attempt at delving into what can be garnered from the application of a DST analysis of learner oral production.

The Theory

DST is the science of dynamic(al), or complex, systems, which by definition contain multiple different and interacting parts. What makes a complex system dynamic is that the system truly is more than the sum of its parts (Larsen-Freeman & Cameron 2008). For evidence of this, you only need to think about your own brain. Modern science is still very far from understanding the intimidating complexity of the human brain. Yet each individual's brain is made up of simple neurons. It is not the physical components of the brain which make it so amazing, but the consciousness which emerges from their interaction. And one of the most complex systems which has emerged from the interaction between human minds is language (Pinker & Bloom 1990).

A complex system exhibits certain important characteristics. Any complex system is nonlinear and chaotic in the mathematical sense. This is different from anarchy; here chaos means unpredictability. It may be possible to predict where a complex system such as a thunderstorm will be a few time steps into the future, but it is nearly impossible to know exactly what path it will ultimately follow (to the chagrin of meteorologists everywhere). This is for two reasons. First, in the natural world, no system is entirely independent. We and everything around us are constantly being bombarded by all kinds of particles, radiation, sounds, and forces, which are part of the greater global system in which we exist. Any and all of these may affect a complex system in myriad ways. Likewise, a complex system is usually made up of components and/or component systems which are continuously interacting. In this way, most systems in the natural world are *nested* (Larsen-Freeman & Cameron 2008).

Complex systems are also highly susceptible to initial conditions, or what is more commonly referred to as the *butterfly effect* (Lorenz 1963). Complex systems exist in *states*. When a system is exhibiting stability at a certain level, it is said to be in an attractor state, kind of like a passing asteroid getting pulled into the gravity well of a more massive celestial body like a planet. At any given moment, a system may be highly vulnerable to even the slightest perturbation. The butterfly effect is just such a perturbation. Given the right initial conditions, a butterfly flapping its wings in one part of the world really could be the trigger to set off a hurricane.

This intimidating combination of components, nested systems, states, and initial conditions can seem somewhat random. However, arguably the most important feature of complex and dynamic systems—especially as it relates to the mind and language—is *emergence* (Holland 1998). Complex systems can experience reorganizations and *phase shifts* from one state to another. When this occurs, an entirely new system, which is a dynamic interconnection of its subsystems and component parts, can emerge. As Thelen and Smith (1994) have eloquently described, this can be seen in the development of a human baby who goes from uncoordinated movement to the reaching out and grasping of objects.

Thus, when we study the language development of a learner, we are observing their emergent language system. A language system also has attractor states; for instance, what often appears as fossilization is most likely a particularly strong attractor state that the language system has been unable to escape from. Similarly, a language system undergoes phase shifts and reorganizations. This, of course, is what happens in those moments when a new concept or structure finally “clicks”. That is not to say that an individual's language system only changes in those salient moments of *noticing* (Schmidt 1992). As a complex system, the language which exists in your brain is undergoing constant change; the change just may be “under the surface” in a subsystem and not yet emergent on a system-wide scale. The human mind

learns language through use (Tomasello 2003), and is a powerful frequency and probability calculator (Ellis 2008). This means that every use of language changes the language system (Larsen-Freeman 2008). Since the system is, at some level, constantly changing, the variability observed in the system can be a useful tool. When a complex system is nearing a system change, variability typically increases. By focusing on such variability in learners, we may be able to gain a deeper, more comprehensive understanding of the underlying processes of language development (Hensley 2011).

Larsen-Freeman (2006) tried to do just this in her analysis of five Chinese ESL learners. Over the course of several months, she recorded and analyzed the learners' performance on a spoken and a written task. Her results showed that each learner's path of language development was quite different, and each learner's language system evolved in unique ways. This development would have been lost if group performance was averaged together. Through a quantitative analysis of learners' writing and a qualitative look at idea units from one learner's oral production, Larsen-Freeman was able to take a snapshot of learner development over the course of her four data collections. By embracing the "messy details" of individual language development, and avoiding traditional reductionism, we can begin to see a clearer picture of development.

In the current small study, I hope to continue this research in a similar vein. Instead of tracking several learners over a few performance events, I have chosen to delve more deeply into a single learner over two-dozen oral productions.

The Study

As mentioned above, this study is the analysis of the oral performance of a single Japanese EFL learner on a series of recordings in an online audio journal. The subject, whom I shall refer to as S from here on, was an 18-year-old first-year student at a public university in Japan. The audio journal was completed by S outside of class as part of her regular coursework. The journal was recorded over a period of 12 weeks and totaled 23 separate recordings for a combined time of 46 minutes 36 seconds. The journal was self-recorded by S using a Poodll (Hunt & Rawson 2012) in-browser Flash audio recording plugin designed for the virtual learning environment Moodle (2012). The audio journals were never corrected or assessed (counting as a completion grade) in the hopes that doing so would lower students' inhibition or anxiety when it came to recording their own English speech. Likewise, there were no rules or mandatory topics; S was free to talk about whatever she wished. The only directions I, the instructor, gave were students should record at least five minutes of audio each week for 12 weeks. If you do the math, you will see that S did not complete the directed 60 minutes of recording time. However, she was one of the most productive journalers in the class. Also, S was a diligent student with flawless attendance. Because of these criteria, I felt S was an acceptable choice for this study.

Once the 12 weeks of audio journaling had ended, I transcribed all of S's recordings into line-by-line utterances. Since all the recordings came from oral productions, I did not attempt to add punctuation or interpret idea unit breaks. Instead, utterances were separated by pauses or intonation. When S stopped speaking, or her intonation fell at the end of a sentence, I began the next utterance on a new line. The resultant transcription looked like the following:

the lecture was english grammar
it is difficult but very interesting

after the lecture i got on the bus with my friend

After the transcriptions were completed, I began my analysis. First, in order to produce quantitative data, various aspects of S's performance were tallied, including number of utterances per recording, number of clauses per recording, words per minute (WPM), average words per utterance (WPU), recording time in minutes, utterances per minute (UPM), and accuracy as measured by number of correct utterances out of total utterances per recording. I chose to use utterances as opposed to t-units as Larsen-Freeman did (2006) mainly for the reason that t-units are typically for the analysis of written language; objectively selecting the boundaries of t-units in natural speech can be problematic, and using utterances seemed to be a more logical choice in this instance. Grammatically, I counted the number of adjective, noun, and adverb clauses; compound, complex, and compound/complex sentences; and compound adjective, prepositional, and verb phrases.

For the qualitative analysis, I followed Larsen-Freeman's example (2006) and identified idea units which emerged multiple times throughout the course of S's journal. The idea units were then analyzed side-by-side in order to observe the variation between them.

Quantitative Findings

Despite the rather limited data set of 46 minutes of oral production over 23 recordings (with an average time of about two minutes), there was quite a bit of variation to be found. As can be seen in Figure 1, even S's self-determined length of recording time changed over the 12 weeks.

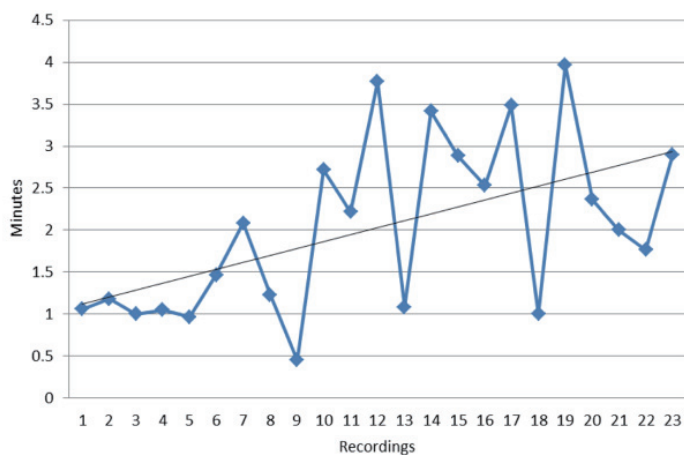


Figure 1: S's recording time in minutes (with trendline)

This is encouraging for an instructor, of course, as S almost consistently made longer recordings after recording nine. However, longer recording time does not necessarily equal more production. As can be seen in Figure 2 below, S's speaking speed, measured in WPM, gradually declined over the course of the 12 weeks of recordings. Thus, despite the fact that S was speaking longer in the latter half of the recordings, she appears to have been speaking more slowly. While I cannot presume to explain exactly why

this slowing down of S’s rate of speech took place, it may have something to do with her use of compound sentences. While S did employ compound sentences early on in the recordings, her use increased as the recordings progressed, and after recording 14, there was at least one compound sentence in each recording (see Figure 3). As is evident in the figures, S’s production was anything but linear, despite the clean-looking trendlines. This is typical of a complex system undergoing change. As S’s language system was exposed to language input and output, it was continuously adapting to the new information. Such consistent change is usually evident in the variation exhibited by a complex system.

Next, a look at the variation and change in S’s fluency and accuracy reveals multi-directional development as well. Larsen-Freeman (2006), in her analysis of written performance, utilized t-units, which she defines as “a minimal terminal unit or independent clause with whatever dependent clauses, phrases, and words are attached to or embedded in it” (p. 597). Since I was dealing solely with oral performance, I measured fluency in average word per utterance instead. Happily, as this was part of an oral communication course, S’s fluency demonstrated a consistent increase throughout the 12 weeks of recordings (Figure 4). This is not to say that either the course or the online audio journal were responsible for S’s increasing fluency, though. Keep in the mind that the data being presented here are merely an attempt to quantify S’s development, not find causes for the observed variations in S’s language system. Also note that S’s increases in fluency were almost consistently demonstrating peaks and troughs in Figure 4 and were anything but linear. Converse to S’s gradual increase in fluency, however, was a decrease in accuracy, as measured by number of grammatically correct utterances out of total utterances per recording (my variation on Larsen-Freeman’s use of t-units for the measurement of grammatical complexity in writing). Over the course of the recordings, S’s accuracy exhibited quite a bit of variation from recording to recording. However, there does seem to be an overall downward trend in accuracy.

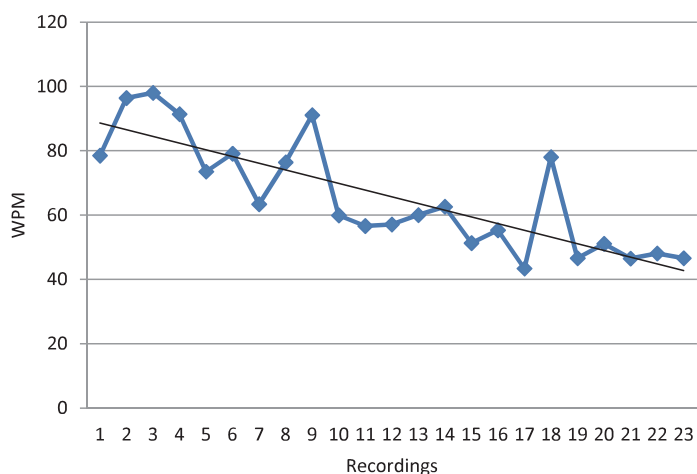


Figure 2: S’s words per minute (WPM) for each recording (with trendline)

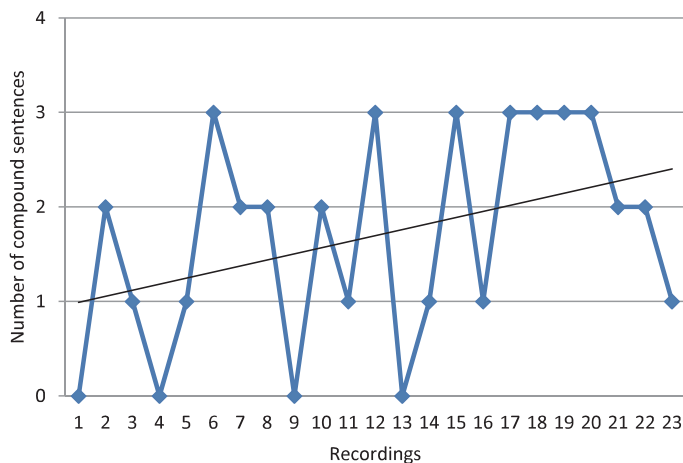


Figure 3: S's use of compound sentences per recording (with trendline)

Finally, in similar fashion with Larsen-Freeman's analysis (2006), I have plotted the rate of change (RoC) in fluency and accuracy in Figure 6. As in the results of Larsen-Freeman's five Chinese ESL learners, here S has exhibited much more fluctuation in the RoC of her accuracy than that of her fluency. Again, this may have something to do with the fact that S was a student in my oral communication course at the time. In that class, we were focusing on fluency, pragmatic features such as fillers, and moving away from textbook, interview-like "conversation" to more natural conversation. S's possible focus on fluency, while reaping the reward of an increase as exhibited in WPU, may have had a detrimental impact on her accuracy. The greater variation seen in her accuracy would suggest that something was most likely going on "under the surface".

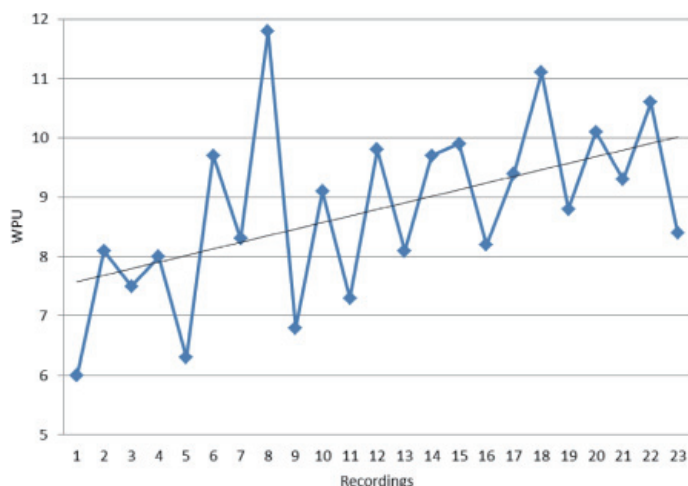


Figure 4: S's fluency, in words per utterance (WPU) for each recording (with trendline)

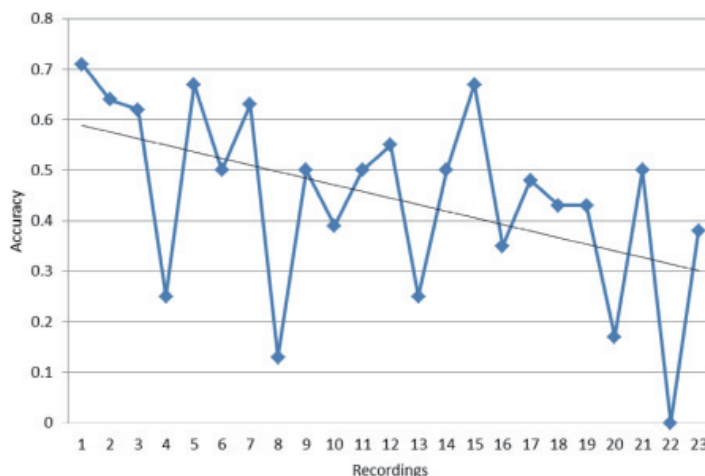


Figure 5: S's accuracy, by the proportion of grammatically correct utterances (with trendline)

Qualitative Findings

As the scope of this paper does not go so far as to warrant an in-depth qualitative analysis of all 46 minutes of S's oral performance data, I would again like to follow in Larsen-Freeman's footsteps (2006) and select portions of S's recordings to examine. In her study, Larsen-Freeman dictated what the content of her subjects' performances would be; thus, she was able to pinpoint recurring idea units for analysis. As mentioned above, since the goal of the audio journal was to create an as affectively non-threatening a medium for extra-class production as possible, recording times and topics were not mandated. Despite this fact, thankfully, S returned to the topic of her part-time job on five separate recording occasions between recordings six and 19. From these five recordings, four recurring idea units can be extracted.

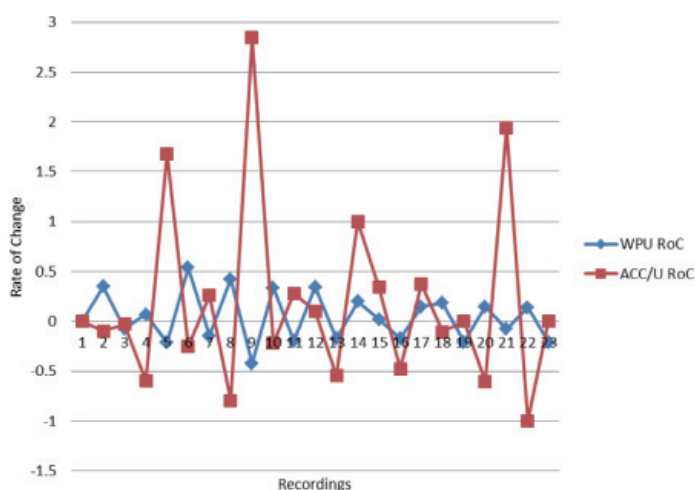


Figure 6: Rate of change (RoC) in words per utterance (WPU) and accuracy (ACC)

The first idea unit was the introduction of S's part-time job as well as the setting (Table 1). In her initial description of her job in recording six, S left out the main verb of the first sentence and failed to use a pronoun for "part-time job" in the second. In recording 10, she reduced the second instance to "The job", which is, conversationally, a step in the right direction toward more natural fluency. She also eliminated the issue of having no main verb by using "had" instead of "had to". S continues the same pattern in recording 12. However, in recording 19, S breaks the pattern of repeating "the job" in the second sentence and instead uses the much more conversational and succinct "I" subject. S seems to have been moving from a more reporting-like language in recording six to a more personalized or subjective use in recording 19.

Table 1: Idea unit 1, introduction of job and setting

Recording 6	Recording 10	Recording 12	Recording 15	Recording 19
But I had to part-time job during golden week	I had a part-time job last week	I had a part-time job on Saturday		I had a part-time job last weekend
My part-time job was handing out leaflets in A___	The job was hand out, handing out leaflets in A___	The job was investigation of sightseeing		I handed out leaflets in A___
		I worked in H___		

The second idea unit from S's job-focused recordings was that of the working conditions and environment (Table 2). In this progression of retellings, we can see that S is moving, again, from a more reporting-like, explanatory language to a more conversational and descriptive one. In recording six, she explains her treatment by the people on the street when trying to hand out leaflets. However, in later recordings, she does not include this information. Part of conversational, storytelling fluency is inferring what the listener wants to hear (Jones 2001). An explanation of the job itself may not be as warranted as the more affective comments S gives in later recordings. Also, by recording 19, S is giving additional details for each sub-topic. When she says it was hot, she describes the scene by mentioning that there was no wind that day. Likewise, instead of just saying there were a lot of people, she gives the reason why there were so many people, contextualizing it and making it meaningful.

Third, in the latter four of the five recordings about her job, S includes some additional details about the day and her duties (Table 3). In recording six, S does not give any additional details, but sticks to more straightforward facts. This is another reason it seems that she is moving away from a more reporting-like telling of events. In conversation, especially casual conversation, interlocutors often want to hear details which will help flesh out a story and make it more personal, and thereby interesting. In that sense, S may be moving in the right direction, conversationally. In recording 10, S has included her realizations about how to go about her job. Then, in recording 12, she gives a one-sentence description and follows it up with examples. Next, in recording 15, she reduces the amount of information to simply the relevant times of work and interview time per person. In recording 19, however, instead of giving factual details about how to perform the job or how long things take, she recounts an encounter she experienced during the time she was working. As an oral story, most would likely agree that this is more interesting due to its personalized and affective nature.

Table 2: Idea unit 2, working conditions and environment

Recording 6	Recording 10	Recording 12	Recording 15	Recording 19
It was very hard work	I was very tired	It was very hard work		That day was very hot
because most people said no thank you or disregarded even I handed out leaflets ...	Because I have to keep smiling, standing, and speaking loudly for a long time	Many people refused and said no thank you or I don't have enough time to answer		So the place I handed out leaflets was very hot
I had to stand, keep smiling, and speak loudly during the work	And Saturday was very hot day	Then, I was disappointed and sad, but I didn't give up		So no wind
Furthermore, golden week was hot				So, I'm very tired ...
And there are many people in A__				That day, there are events in A__
				The event was a singer, the singer came to A__ and she was singing a song
				So many people were gathered, so there are many people in A__

Table 3: Idea unit 3, additional details

Recording 6	Recording 10	Recording 12	Recording 15	Recording 19
	When I handed out leaflets for the first time, I didn't know the way of handing out leaflets well	The investigation of sightseeing was asking a question for many people	So I worked for about seven hours, and it took about five minutes to ask and answer the questions, each person	When I handed out leaflets, a man was walking through me
	But now I understand the trick of handing out leaflets well	For example, where are you from?		So he gave me a candy
	The importance is smiling	How old are you?		I was very confused
	But, I thought I have to keep smiling whatever happened	How many times have you been to N__ or H__?		But he said "fight"
	For example, I was complained by customers, or there are few people received leaflets	And how much did it cost to travel to N__?		So I was very happy
		And so on		

Finally, S included something of a conclusion in four of the five job-related recordings. At first, S gives what is, in Japanese culture, an appropriate ending statement when she says that she was tired but views her experience as positive. In recordings six and 10, it is quite likely that S was simply translating her Japanese cultural norms into English for use. She ends the same way in recording 12, but before that, she gives much more information about how she felt about her job in relation to the other individuals she was working with. Again, including these subjective feelings would help to make her story more accessible to an interlocutor. In recording 19, S again provides her feelings about the job. However, in this recording, she does not include the rote Japanese-like ending, but ends with an evaluation of her own performance and desire for the future instead. Naturally, this can be considered more natural for oral, especially casual, production. Overall, it would seem that, during the course of the audio journal recordings, S was moving away from a report-like use of language to a more affective and personalized use.

One final interesting point emerged from these five job-related recordings in the area of accuracy and grammar. As stated in the quantitative section, S's overall accuracy fell during the 23 recordings. However, if the accuracy of the five job-related recordings is examined, there is actually a slight *increase*. Apparently, S's retelling of similar job-related situations, which is also known as iterations or *iterative* development in DST, allowed her to at least maintain a level of accuracy that was lost in other, one-shot recording topics. This makes a powerful case for iterative learning and practice, another facet of DST which may hold promise in the area of language development. Additionally, as mentioned in the quantitative section above, S's use of compound sentences increased over the course of the recordings. Interestingly, all five of the job-related recordings included at least two compound sentences, and four of the five of them included three. This, combined with the slight increase in accuracy over the job-related recordings, would suggest that a deeper look into the effect of iteration and iterative learning can have on a learner's language system.

Table 4: Idea unit 4, conclusion and evaluation

Recording 6	Recording 10	Recording 12	Recording 15	Recording 19
I was exhausted, so I couldn't do anything that I wanted to do	It, the job, was very tired, but I thought it was a good experience for me	So, job's task was asking questions more than fifty people		So, the [quota] was handing out leaflets one thousand papers, so this time I couldn't complete the [quota]
But I thought it was a good experience		I completed a task, so I'm very happy		I was very sad
		Other people I worked together didn't complete the task		But next time I want to finish the leaflets
		So they are very disappointed and sad		
		I was very tired, but I'm very happy		
		And I thought it was a good experience for me		

This analysis has been an initial effort to fulfill Larsen-Freeman's call for "individual micro-developmental studies, which seek to understand the mechanisms" learners develop by (2006: 614). What we saw emerging in S's language system in the areas of fluency, accuracy, compound sentences, WPU, and iterations of idea units may be unique to her as an individual. However, the data here would seem to suggest that, in a class focusing on oral communication supplemented by an online recorded audio journal, sufficient exposure to and use of target language structures may be enough to effect a system shift in a learner's language system. Just as S's production changed, amidst the expected variation, we may be able to see similar outcomes in learners with comparable backgrounds. In an EFL setting like Japan, where classes are largely homogenous, this may be good news. However, determining whether this is truly the case will take further research into both intra- and inter-individual variability and system change in similar learners. The path which we can take using DST in applied linguistics has become to materialize, but there is still much work to be done.

Conclusion

This paper has been an attempt to delve more deeply into the performance and variation of an individual language learner. Much of what was found in S's data was in accordance with what Larsen-Freeman (2006) found as well. In an effort to avoid reductionism, S's intra-individual variation has been discussed. As should be evident at this point, language development is nonlinear and incredibly complex. I have not presumed to draw any causal or predictive conclusions from this analysis of a single learner, but it is my hope that this deeper glimpse into the oral production of a learner's system will help to broaden the theoretical base of DST in applied linguistics. It is my belief that DST and complex systems will continue to be employed as the new paradigm in applied linguistics. Complexity can be daunting, but until we learn how to deal with and extrapolate from it, we will likely not be able to achieve a complete understanding of the complex system that is the language learner.

Notes

¹ For a look at the areas of language development being researched, see the special supplemental issue of *Language Learning* published in 2009.

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