

# A Dynamic System Approach to Willingness to Communicate: Developing an Idiodynamic Method to Capture Rapidly Changing Affect

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Willingness to communicate (WTC) can be conceptualized as changing from moment to moment, as opportunities for second-language communication arise. In this study we present an idiodynamic methodology for studying rapid changes in WTC. The methodology consists of recording responses from six young adult, female speakers to second-language communication tasks, their self-ratings of changes in WTC during those tasks, and reporting of their experience and attributions for fluctuations in WTC. The role of stable personal characteristics of the speakers is taken into account, as are observations made by an observer during the respondents' speech. Conceptualizing WTC as a dynamic system allows for an examination of the variation in WTC over time. The results show both consistency and variation in WTC even among a relatively homogeneous sample of speakers. Searching memory for vocabulary was identified as a key process affecting WTC, though it is argued that other factors (including language anxiety) are also operating to affect WTC. After concluding that WTC can be seen as a dynamic system, limitations of the methodology and future research directions are discussed.

## INTRODUCTION

Second-language (L2) communication is a remarkably fluid undertaking, especially considering the wide variety of processes that contribute to language learning, skill development, and the many contexts that arise for L2 communication. Whereas almost everybody acquires a native language to a standard that allows for smooth social interaction, the same cannot be said for second languages. If we accept that second-language learners must communicate in order to acquire the language (Savignon 2005), then learners are required to knowingly use underdeveloped L2 skills. Some people are more willing than others to accept this unusual communication situation. Beyond issues of basic competencies, second languages also evoke cultural, political, social, identity, motivational, pedagogical, and other issues that learners must navigate on-the-fly. This is the dynamic nature of willingness to communicate (WTC, see MacIntyre *et al.* 1998) and highlights its emergent properties. Currently, we

do not have an adequate methodology to study WTC from a dynamic perspective, a situation we hope to remedy with the present study.

It is striking how quickly various factors converge to exert an impact on volitional choices for L2 communication (Ellis 2007; MacIntyre 2007); a timeframe of 1 or 2 s at most. Learners approach L2 communication with a wide range of WTC, and this willingness is re-evaluated on an ongoing basis, even as the language is being used. Speakers monitor their own speech and the reaction of their interlocutor(s). On occasion a speaker will quickly abandon communication after making a mistake or when self-confidence suddenly dissipates. We will investigate the dynamic changes in WTC over a very short period of time using a new methodology designed to capture moment-to-moment changes in the speaker's affective state.

## WTC

WTC represents the intention to speak or to remain silent that can be considered the most immediate determinant of L2 use, reflecting the culmination of a variety of proximal influences (in particular state anxiety and perceived communication competence) and distal influences, including personality traits such as extraversion (MacIntyre and Charos 1996; MacIntyre *et al.* 1998; Clément *et al.* 2003). The situated approach of the pyramid model (MacIntyre *et al.* 1998) examines WTC as a state of mind, a willingness to engage in conversation with a specific person at a specific moment, given a state of self-confidence as a communicator. In this model, the linguistic dimensions of prior learning combine with social and psychological aspects of language use to create WTC. Prior studies, using a contextual approach to WTC, have been qualitative and retrospective. Contextual research has highlighted the importance of subtle changes in the situation that affect WTC (Baker and MacIntyre 2000; Kang 2005; MacIntyre *et al.* in press). To date, however, no study has examined the moment-to-moment dynamic changes in WTC as communication unfolds that were suggested by the original pyramid model and which are at the heart of the present study. Adopting this research focus requires a new approach to studying dynamic changes in affect.

## Idiodynamic research

Although dynamic systems theory is relevant to the present discussion (see Cameron and Larsen-Freeman 2007; Dörnyei 2009), and we will return to it later, the inspiration for this methodology stems from the renowned American psychologist, Gordon Allport. Allport (1937) used the term nomothetic to refer to the study of personality traits that are shared by many people and differ in degree (such as extraversion). In contrast, the term idiographic was used to refer to an approach to understanding the pattern of traits that make a person unique. Allport (1962: 409) wrote:

The commonalities in personality are the horizontal dimensions that run through all individuals. We focus our attention chiefly

upon these commonalities for example, upon common traits of achievement, anxiety, extraversion, dominance, creativity, or upon the common processes of learning, repression, identification, and aging. We spend scarcely one per cent of our research time discovering whether these common dimensions are in reality relevant to Bill's personality, and if so, how they are patterned together to compose the Billian quality of Bill. Ideally, research should explore both horizontal and vertical dimensions.

Studying the features that make up the unique patterns of an individual personality was neither by no means unique to Allport (Hurlburt and Knapp 2006) nor to the study of personality. Although most personality theory was, and still is, dedicated to a nomothetic understanding, the issue of unique dynamics within an individual was taken up by Allport's colleague Saul Rosenzweig (see Rosenzweig and Fisher 1997; Kaufman 2007).

Rosenzweig (1986) forcefully demanded a focus on events, rather than traits. To highlight the contrast with Allport's approach, Rosenzweig (1986: 242) coined the term *idiodynamic* to refer to his focus on events as key to understanding personality.

A unique dynamic organization of events through time distinguishes one person from others in terms of the peculiar experiential history from which recurrent idiodynamic norms are derived. These norms, in conjunction with nomothetic principles and demographic generalizations, afford the necessary keys to understanding a given idioverse (a personal universe of multiple events).

In this way, Rosenzweig captures both the vertical and horizontal analyses advocated by Allport, but with a focus on events as the key organizing principle. The need to better understand the dynamic organization of events extends beyond personality theory, and can be applied to SLA.

Occasions where L2 use is possible are both language learning opportunities and communication events. For this reason, we believe that a focus on changes within a communication event leads to examining WTC from a dynamic systems perspective. According to deBot *et al.* (2007), dynamic systems have four key properties. First, dynamic systems change over time such that each state is a transformation of a previous state. Second, dynamic systems have complete interconnectedness. That is, variables in the system are linked together and influence each other making a complete specification equation impossible in all but the simplest systems. Third, dynamic systems are self-organizing into preferred states (attractor states) and states that will not be preferred (repeller states). Change is to be expected, even from preferred states, as variables affecting the system change over time. Fourth, the systems possess non-linearity or threshold effects (sometimes called *the butterfly effect*). Small changes in one part of the system may have large effects in the overall system, or large disturbances may produce only small effects in the overall system.

Diane Larsen-Freeman (2007), an early advocate of studying dynamic processes in SLA, suggests that one of the insights to be made by taking a more dynamic approach to studying language and its development is ‘... to see that real-time language processing, developmental change in learner language, and evolutionary change in language are all reflections of the same dynamic process of language usage’. Larsen-Freeman (2007: 783) goes on to emphasize that the:

... processes are not sequential, but rather they occur simultaneously, albeit at different timescales. It is not that you learn something and then you use it; neither is it that you use something and then you learn it. Instead, it is in the using that you learn—they are inseparable.

The idea of talking in order to learn is central to the role of WTC in the second language (MacIntyre *et al.* 2003).

Methods to conduct research in this area are just beginning to be developed (deBot *et al.* 2007: 14). The issue of appropriate methodology also was a prominent consideration in the work of Allport (1962: 410) who cautioned:

It is not sufficient to ‘intuit’ the pattern of Bill or Betty. All of their friends do this much, with greater or less success. A science, even a morphogenic science, should be made of sterner stuff. The morphogenic interpretations we make should be testable, communicable, and have a high measure of predictive power.

Forty-five years later, as interest in dynamic methods increases, Ellis (2007) also recommends applying empirical rigor and the logic of methodology to the study of dynamic systems. Although there are numerous research questions that might be considered, even on a timescale as brief as fractions of a second, our concern here is with a method to capture moment-to-moment changes in WTC.

### **The idiodynamic method**

The present study develops an idiodynamic approach to studying fluctuations in WTC that occur from moment-to-moment. Within this framework, we can describe changes in WTC over a short period of time and the speaker’s own rationale for the changes. The methodology has four parts:

- 1 A communication task is recorded for immediate playback.
- 2 With the help of a research assistant and specially developed software, the recording is reviewed by the participant who completes a moment-by-moment rating of WTC. A graph is produced showing fluctuations in WTC.
- 3 The graph is reviewed and reasons for changes in WTC are discussed. The process is guided by the recommendations for stimulated recall (Gass and Mackey 2000).

4 The complete session is transcribed.

The emerging data can be supplemented with standard paper-and-pencil measures, demographic variables, and other information to provide access to nomothetic principles and demographic generalizations that Rosenzweig (1986) suggested be examined. This allows both for a horizontal analysis of common patterns across research participants and a vertical analysis of unique, interesting patterns within an individual. In the present study, the major research focus is on the vertical analysis and therefore is aligned epistemologically with qualitative research rather than with a quantitative approach.

### **The present study**

The present study takes a mixed methods approach, with emphasis on the qualitative integration of information, using the idiodynamic method to examine changes in WTC over eight communication tasks, some easy and others difficult. Given the novelty of this approach, our research questions are modest:

- 1 To what extent do the different tasks affect WTC and/or the amount of speaking time, and do ratings of WTC correlate with speaking time (assessed quantitatively)?
- 2 To what extent do we see variation in WTC over time and is there evidence that a dynamic systems approach can be used to document changing levels of WTC (assessed qualitatively)?
- 3 What attributions do the individual participants make for increases and decreases in WTC (assessed qualitatively)?
- 4 Are there visible signs of affect, especially anxiety, perceived by an interlocutor that are not discussed by the participants themselves (assessed qualitatively)?

Participants answered a survey comprised of established paper-and-pencil measures of L2 affect and then responded to the communication tasks. Their performance was videotaped, self-rated for changes in WTC, then reviewed to discuss changes in WTC, and finally transcribed.

## **METHOD**

### **Participants**

A homogeneous sample was required for the present study to allow for focus on the development of the methodology. The sample includes six female university students, 19–21 years old, all born in Canada, who speak English as their L1, and all had been involved in a French immersion program. None currently would be considered fluent in French. Participants were majoring in Communication, History, Political Science, and Psychology.

## Materials and procedure

After giving informed consent, participants completed a questionnaire comprised of three scales used in prior research.

- 1 WTC, trait level (WTC-Trait; MacIntyre *et al.* 2003). Two 20-item scales assessed respondents' usual willingness to initiate communication in French and in English (separately). An example item is 'Talk in a large meeting of friends'.
- 2 Anxiety (PRCA-24; McCroskey 1982). This 24-item Likert-type scale assessed the level of apprehension about communication in French and English separately. Anchors of the 5-point scale were *Strongly Disagree* and *Strongly Agree*. An example item is: 'Ordinarily I am very tense and nervous in conversations'.
- 3 Extraversion (Eysenck and Eysenck 1975). The 12-item subscale measuring extraversion was adapted from the Eysenck Personality Questionnaire, using items referring to interacting with other people. The anchors of the 5-point scale were *Strongly Disagree* and *Strongly Agree*. An example item is 'Are you a talkative person?'

## L2 tasks

Eight oral tasks, presented in the following order, were adapted from the MacIntyre *et al.* (1999) study of L1 WTC: (T1) Describe what you are wearing; (T2) Discuss the education system of your home province in some detail; (T3) Discuss the role of Parliament in the Canadian system of government; (T4) Order a complete meal as if in a restaurant; (T5) Describe your hobbies; (T6) Describe what you see happening in this painting; (T7) Count to 100 by 10s; and (T8) Give directions to [a local] shopping mall. There was minimal conversation during the participant's responses. The context is analogous to an oral examination. We began with an easy task, then mixed difficult and easy tasks with the hope of producing fluctuations in WTC.

## Camera

A JVC Mini-DV camera recorded each of the participants directly to a digital file on a computer. The video was captured in the '.wmv' format to be viewed using Microsoft Windows Media Player software.

## Dynamic WTC ratings

Following the completion of the tasks, respondents rated their WTC while watching a video recording of their performance. Windows-based software was written to collect the ratings. The software plays the participant's video-taped interview in one window and records ratings of WTC in another window. As participants watched their video, clicking a computer mouse

raised or lowered the level of WTC shown on the screen (ranging from  $-5$  to  $+5$ ). The software included a feature that moved the rating one step toward zero every second if no response from the user was given. This was written into the software to require active responding from the participants (unless their WTC was equal to zero). Output from the software included both a bitmap graph of the dynamic WTC ratings and an Excel compatible spreadsheet with WTC and time data.

### Discussion of changes in WTC

A graph of dynamic WTC ratings was printed for each participant immediately after the ratings were completed. A research assistant played back the video of the tasks a second time, stopping it at each point where the graph showed a noticeable change in dynamic WTC. Participants were asked to describe why the change occurred. This discussion also was videotaped, transcribed, and translated where necessary.

### Research assistant's ratings

The research assistant viewed the videos after the session and wrote a narrative report describing the respondent's affective reactions. The information from this narrative has the advantage and disadvantage of being based on the intuitive feel for the other person that can only be gained *in situ*. Although there was no objective coding, the research assistant, as an involved interlocutor, used his or her intuition to perceive the other person's emotional state and nonverbal communication (Epstein 2008), consistent with the role of the researcher as a tool in a qualitative investigation (Maxwell 2005).

## RESULTS

The results will be presented in two parts. The two preliminary analyses, presented to show how the method might be used in quantitative experimental methods, are a horizontal (nomothetic) examination of dynamic WTC ratings and speaking time. The main set of analyses has a vertical perspective, with a focus on the individual speaker.

### Horizontal analyses

Two within-subjects repeated measures analyses of variance (ANOVAs) were conducted to examine whether mean dynamic WTC ratings or Speaking Time differed significantly over the eight tasks. A significant difference was found among the tasks on WTC,  $F(7, 35) = 3.72$ ,  $P < 0.01$ , partial-eta squared = 0.43. A Newman-Keuls *post hoc* analysis of means (see Table 1) showed that WTC for T3-government was significantly lower ( $P < 0.05$ ) than WTC for T4-meal, T5-hobby, T6-picture, and T7-counting. A similar ANOVA revealed significant

Table 1: Mean dynamic WTC and speaking time across eight tasks

	Mean dynamic WTC rating	Standard deviation	Mean speaking time	Standard deviation
Task 1	0.645	1.06	16.3 <sup>a</sup>	6.28
Task 2	0.125	2.30	27.2 <sup>a</sup>	29.29
Task 3	-1.29 <sup>a</sup>	2.25	15.8 <sup>a</sup>	8.01
Task 4	1.35 <sup>b</sup>	1.62	21.5	4.42
Task 5	1.65 <sup>b</sup>	1.59	17.3 <sup>a</sup>	2.66
Task 6	1.08 <sup>b</sup>	1.65	26.7	5.89
Task 7	1.62 <sup>b</sup>	1.48	26.2	10.94
Task 8	0.208	2.13	42.3 <sup>b</sup>	8.19

Note: WTC rating scale range from -5 to +5; speaking time measured in seconds. <sup>a,b</sup>Means within a column with different superscripts are significantly different ( $df=35$ ,  $P < 0.05$ ) according to the Newman-Keuls *post hoc* test of means.

fluctuations in Speaking Time  $F(7, 35) = 3.14$ ,  $P < 0.05$ , partial-eta squared = 0.39, with the largest difference recorded between speaking time for T8-directions and T3-government. It can be noted that there was a near-zero correlation between dynamic WTC ratings and speaking time over the eight tasks ( $r = 0.02$ , n.s.).

## Vertical analysis

We now examine each of the participants individually taking advantage of the triangulation of information in the idiodynamic data. The focus is on the participants' reactions as they discussed the dynamic WTC ratings, not on the linguistic quality of their speech or a statistical analysis of the ratings. In this study, the questionnaire measures are used only to provide background information for each participant (see Table 2).

### Mary

#### Phase 1

Among the six participants' questionnaire data, Mary<sup>1</sup> had both the lowest WTC-Trait score in French and the lowest French anxiety score (Figure 1). She also showed relatively low WTC-Trait and anxiety in English. During the interview, Mary showed only a few signs of anxiety. Mary sometimes used English responses such as 'I don't know how much sense that makes' when responding. After successfully completing T1-clothing, she looked surprised when presented the second task (T2-education), hesitated and then

Table 2: Scores on extraversion, WTC-trait, and anxiety for the six participants

Participants	WTC-Trait French (range 0–2,000)	WTC-Trait English (range 0–2,000)	Anxiety French (range 24–120)	Anxiety English (range 24–120)	Extraversion (range 12–60)
Mary	675	1495	52	41	57
Sue	725	1540	94	70	28
Mabel	930	1910	90	62	48
Agnes	1010	1400	103	71	37
Betty	1075	1405	114	112	30
Gertrude	1757	1902	82	36	58

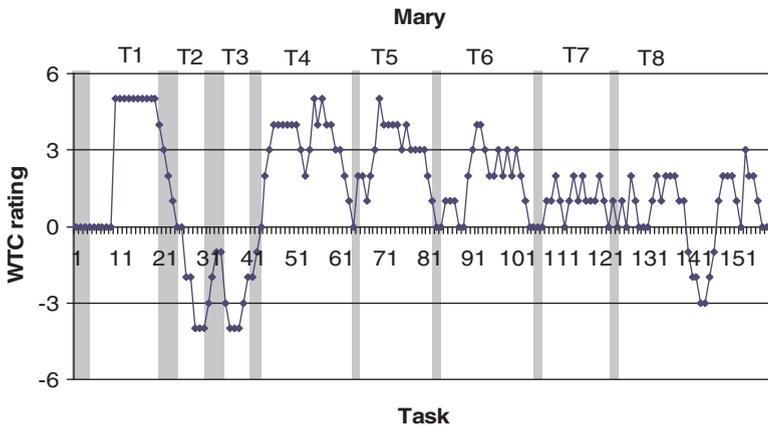


Figure 1: Mary's WTC ratings

abandoned it. She then abruptly said 'no' to the next task (T3-government). On the fourth (T4-painting) and fifth tasks (T5-counting) *Mary* ceased making eye contact. When presented with T6-painting she seemed uncertain. In English she explained that she lacked the vocabulary to describe the image. She chuckled as she was asked to count by 10s (T7-counting). As her answer progressed, her response rate slowed noticeably as she gave an incorrect order of the numbers in French. As her answer deteriorated, she reverted to English and then abandoned the task. On the final task (T8-directions), *Mary* seemed uncomfortable and her dynamic WTC rating temporarily dipped below zero.

## Phases 2 and 3

*Mary* had the lowest score on the French WTC-Trait questionnaire, but began the tasks with a positive dynamic WTC rating. She felt she had good vocabulary on the topic of clothing (T1). When asked why her WTC rating dropped on T2-education, *Mary* stated adamantly that she did not know the proper terminology to respond to the question, nor for the next question (T3-government) where her WTC remained low. WTC increased substantially for T4-meal which *Mary* attributed to vocabulary knowledge. At this point *Mary* herself stopped the video playback to say that she was hesitating on T4-meal because of the many options available; she was assessing which options would sound best. WTC decreased on T5-hobby because she does not have a hobby. For T6-painting, *Mary's* WTC ratings were positive, fluctuating around zero; she admitted to being unsure of appropriate vocabulary. Throughout T7-counting, her WTC level remained positive, although she said she hates numbers because they make her nervous. On the final task (T8-directions), her WTC ratings decreased below zero. She believed that she should be able to respond but could not find the words, leading to a decline in confidence. *Mary* said it was a topic she needed to study ('directions, left/right, etc.').

*Sue*

## Phase 1

*Sue* had the second-lowest WTC-Trait score in French and was the least extroverted participant (Figure 2). Although she appeared to be relaxed at the beginning of her session, her comfort level evaporated on T2-education and T3-government. For T4-meal, her response was list-like, her speech rate was

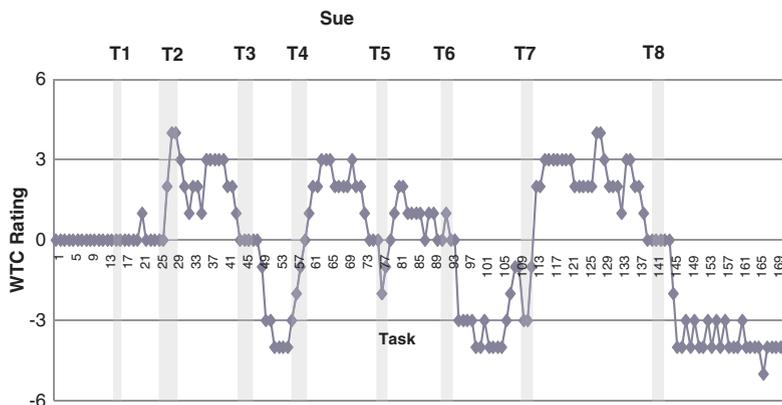


Figure 2: Sue's WTC ratings

slow, and she reverted to English. *Sue* paused before responding to T5-hobby. Although she made little eye contact, she seemed confident in her response. Her rate of response was slow on T6-painting; she responded briefly in ungrammatical French. She started T7-counting by again pausing for a moment, smiling lightly, and then responding. *Sue's* response rate was noticeably slow even though she gave a correct response. For the final question, T8-directions, *Sue* was biting her lip, paused before responding, and frequently broke eye contact. Her directions were generally correct though some words in French escaped her, such as the word for 'left'.

### Phases 2 and 3

*Sue* explained that her high dynamic WTC ratings during the study were based on confidence in her vocabulary. WTC ratings decreased for T3-government because she 'doesn't know anything about government in English either'. For T4-meal, *Sue's* WTC ratings increased. Although she hesitated during the task, she stated in the interview that she knew more than she thought. In the following excerpt, *Sue* describes the carry-over effects from T5-hobby to T6-painting: 'Towards the end of the last answer I felt like I was doing bad and then I saw you pull out the picture, I knew I wasn't going to be able to explain that so...'

### Mabel

#### Phase 1

A particularly interesting event happened when *Mabel* was presented with the counting task (T7) (Figure 3). She started off well but she failed to remember one of the numbers (80). *Mabel's* attempts to recall the correct

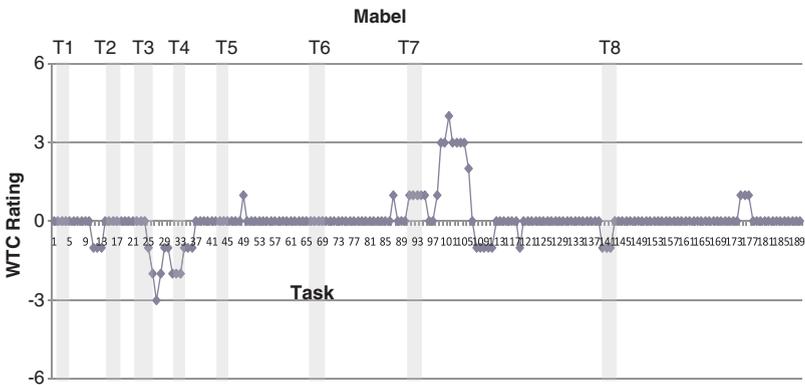


Figure 3: Mabel's WTC ratings

vocabulary lasted over 60s. From the transcript (WTC ratings appear in italics above the text):

RA—Please count to one hundred by tens.

*0 0 1 3 3 4 3 3 3 2 0 -1*  
 Mabel—Ok. Dix, vingt, trente, quarante, cinquante, soixante, soixante-dix....(laughs and  
*-1 -1 -1*  
 puts her hand to cover her mouth) oh my god I can't believe I can't remember that....I  
*-1 -1 -1*  
 can't believe I can't remember eighty....

RA—Ok, you want to just go to the next one?

*0 0 0 0 0 0*  
 Mabel—No, I'm trying to think of it in my head...(counts quietly, barely audible) ... I  
*0 0 0 0 0 0*  
 can't believe I can't remember that. Soixante-dix...(inaudible) and I can't get ninety if I  
*0 0 0 0 0 0*  
 can't get eighty...Cent...I can't think of eighty or ninety...you're going to tell me this  
*0 0*  
 later 'cuz I can't remember it.

## Phases 2 and 3

During the discussion of dynamic WTC ratings *Mabel* explained feeling generally awkward about the interview and being recorded on videotape. She described having to think about what she was going to say and during this thought process she felt her WTC ratings decline or increase, depending on how rapidly the information came to mind. On T7-counting her WTC dramatically increased to +4, then decreased to -1 when she was unable to recall '80'. She said that her WTC 'crashed' with an unexpected loss of confidence. On T8-directions, WTC just as quickly returned to neutral.

## *Agnes*

### Phase 1

*Agnes* started her response to T1-clothing by giving a brief, but grammatically correct response (Figure 4). This however changed quickly for T2-education. She seemed surprised by the question and simply said 'no', shook her head, and laughed. For T3-government, *Agnes* responded in English that she could not answer; that she was not 'trying to be difficult,' but she did not know how to answer. For T4-meal, *Agnes* broke eye contact, paused to collect her thoughts, and then slowly gave a brief, correct response, posed in the form of a question (as if talking to a waiter). She did not seem satisfied with her response. For T5-hobby *Agnes* responded quickly, with no hesitation, used hand gestures, and showed little difficulty using French language. Her response rate changed again for T6-painting where she responded slowly but with good grammar when describing the image. After responding, *Agnes*

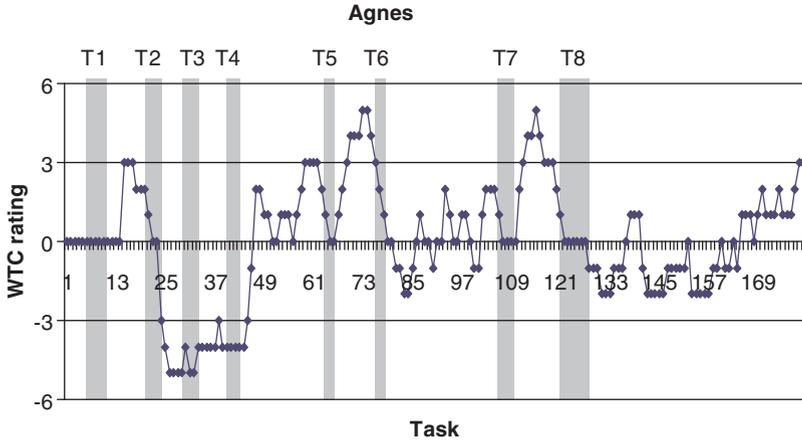


Figure 4: Agnes' WTC ratings

shrugged her shoulders and raised her eyebrows; she seemed to be uncertain of her response. For T7-counting she inhaled deeply, played with a ring on her finger, and broke eye contact while responding. She answered quickly and correctly. When asked T8-directions she smiled and paused, rolled up her sleeves, adjusted her clothing, and then gave her response.

### Phases 2 and 3

Agnes's dynamic WTC rating started moderately high (+3) for T1-clothing, but declined substantially over the next two tasks (T2-education and T3-government) because she lacked both knowledge and vocabulary. For T4-meal her rating of WTC increased, fluctuating between +1 and +3, as she was searching for vocabulary and retrieving items from memory. At T5-hobby, Agnes' WTC increased to +5 because, she said, the vocabulary came easily to mind. With T6-painting WTC ratings initially were negative but increased after 10 seconds because she was trying to figure out what to say. She said she feels more confident when she can plan what she is saying. Her WTC increased to +5 for T7-counting; she found the task easy. For T8-directions, she felt uncertain because she should know how to complete the task.

### Betty

#### Phase 1

Betty's pattern of questionnaire data is interesting (Figure 5). According to the questionnaire scores, she is introverted and the most anxious of the participants in both English and French, but she had the second highest French WTC-Trait score. During the interview, she broke eye contact frequently,

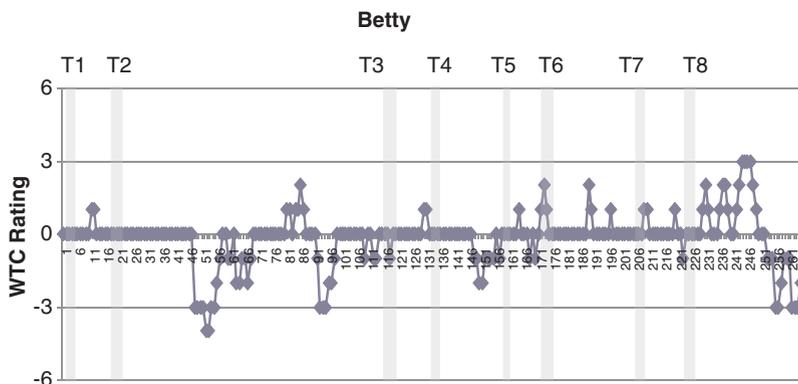


Figure 5: Betty's WTC ratings

had a slow response rate and spoke in a monotone voice. The research assistant felt that she was looking at him for reassurance during her responses. Throughout her interview her answers were brief, with grammatical errors. *Betty* frequently paused and took more time than others to speak. Overall, the research assistant, who did not know *Betty's* questionnaire scores, said that she appeared noticeably anxious.

### Phases 2 and 3

*Betty's* dynamic WTC ratings were close to zero for T1-clothing and she said that was because she felt reluctant to describe what she was wearing. On T2-education, *Betty* attempted to link ages to grade levels, but struggled to find words to express her thoughts. After approximately 20 s, *Betty's* WTC dropped dramatically because she felt out of practice. WTC was low on T3-government, she refused to answer the question, and remained low for T4-meal. She had positive WTC for T5-hobby, T6-painting and T7-counting, *Betty* said that once she remembered the vocabulary, her WTC increased. For the final question, T8-directions, *Betty's* WTC was high initially but decreased as her response ended. She said she was having trouble with the task and would normally have used more detail.

### Gertrude

#### Phase 1

*Gertrude* stood out because her questionnaire score for French WTC-Trait was by far the highest in our sample and her dynamic WTC ratings during the experimental session never dropped below zero (Figure 6). She was the most extroverted member of the sample with relatively low anxiety in both French and English. She consistently made eye contact with the research

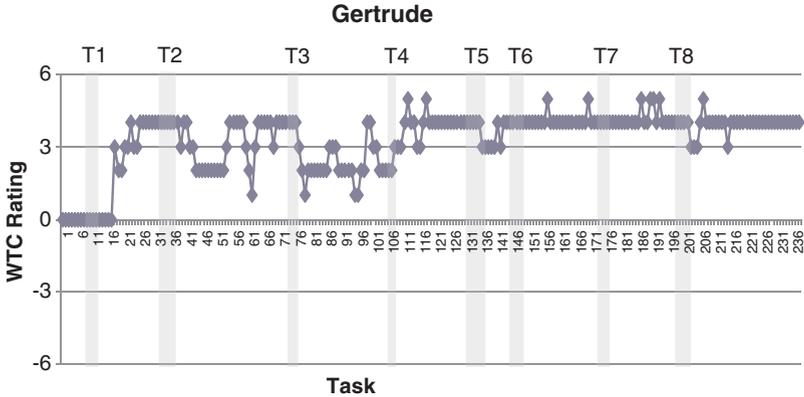


Figure 6: Gertrude's WTC ratings

assistant, only looking away when searching for words. For T1-clothing Gertrude's response rate was steady, her posture seemed relaxed. For T2-education, after requesting a restatement of the question, she launched a detailed, though tangential response. Rather than describing the structure of the education system, she explained her belief that the education system should do more to integrate children with disabilities into mainstream classrooms. With T3-government she laughed nervously but responded quickly and appropriately, pointing out that she was a Political Science student. She responded quickly to T4-meal and T5-hobby. On T6-painting she used well formed sentences, and even speculated about the age of the man in the painting based on his clothing style. Gertrude then sat back in her chair as T7-counting was being asked. She looked at the table while she was responding, stumbled over a few numbers but recovered quickly. On the final question, T8-directions, Gertrude's facial expressions showed a sign of surprise. Her smile faded, eyebrows raised, and she took a deep breath before responding. In the interview she expressed dissatisfaction with the level of detail in her response.

### Phases 2 and 3

Gertrude's dynamic WTC rating initially was positive (+3), she simply stated she had a moment to think about what to say and then said it. This is when she said 'I don't know why. I just, I do that anyway. That's the way I am, I talk'. WTC ratings dropped during T2-education when she gave a tangential response. The lowest level of WTC was observed for T3-government where she felt less confident and realized at one point she was answering incorrectly during the task. With T4-meal and T5-hobby, WTC fluctuated over the course of her response. She explained that she had to think

more about the specific words she wanted to use. Her dynamic WTC ratings remained high during T6-painting and dropped only slightly as she began her response to T7-counting. *Gertrude* finished off T8-directions with a high WTC, dipping slightly when she forgot the French word for 'shopping mall'.

## DISCUSSION

The idiodynamic method provides information about the dynamics of WTC that is not available from nomothetic methods used in previous research. The second and third research questions addressed the issue of changes in WTC during the tasks. We see remarkable change over the few minutes that respondents engaged with the tasks in this study. These fluctuations are lost when considering only a single summary score, such as the WTC-Trait scores used in previous research (e.g. MacIntyre *et al.* 2003). We also see consistencies in the patterns associated with tasks, such as a decline in dynamic WTC ratings for T2-education. We see consistency within persons as well, as in *Gertrude's* high dynamic WTC ratings and the flat pattern shown by *Betty*. The third research question addressed the respondents' rationale for changing WTC. Respondents most often attributed falling WTC to the inability to find L2 vocabulary items, though we believe that there is more going on than meets their introspective eye. The fourth research question asked if the research assistant, as an engaged interlocutor, observed changes in the speaker's affect that were not discussed by the respondents.

The research assistant saw signs of anxiety that were not always reflected in the respondents' self-ratings of WTC. The moment-to-moment relationship between language anxiety and WTC appears to be complex—at different times the variables seem positively related, negatively related, or even independent. Previous quantitative research shows a negative correlation between anxiety and WTC-Trait scores (e.g. Baker and MacIntyre 2000). This is consistent with both theory (Wen and Clément 2003) and prior qualitative research (Kang 2005). However, in the present study changes in WTC seem to be somewhat independent of anxiety when considered within a person on a moment-by-moment basis. Anxiety can rise and fall without necessarily changing WTC. A major advantage of describing a dynamic system is a clear focus on the timescale in which observations are made (Larsen-Freeman 2007).

### WTC as a dynamic system

In the present data we see evidence for the four key properties of dynamic systems (de Bot *et al.* 2007). The first property is that dynamic systems change over time such that each state is a transformation of a previous state. Our methodology did not test this property but rather used a measurement strategy

that provided a continuous curve describing WTC. For example, it was not possible to 'jump' immediately from a WTC score of  $-3$  to  $+3$ . Respondents could, and did, show rapid changes in WTC, but the WTC score at any particular time was partially a function of WTC at the preceding moment. This is consistent with respondents' descriptions of the process. They themselves often linked one task with the preceding one. For example, Sue described how her poor performance on T5-hobby carried over to T6-painting. We cannot know with certainty what might have happened had the tasks been presented in a different order, because task performance and WTC are partially based on the performance for the previous task.

Sue's experience also demonstrates an interconnectedness of dynamic systems that we see to some extent in all of the participants. In Sue's case, the affective system exerted a strong influence on linguistic performance. When she felt discouraged, she abandoned the next difficult task. Furthermore, we see interconnectedness between the affective system and cognitive system, specifically between dynamic WTC and vocabulary retrieval among Mary, Sue, Agnes, Gertrude, and Betty. When vocabulary items do not flow easily to mind, WTC declines. For familiar tasks WTC tends to be higher than for unfamiliar tasks (such as describing the education system, parliament, or a painting). It would appear that ease of vocabulary retrieval plays a major role in dynamic changes in WTC, especially among speakers who are not particularly fluent.

Dynamic systems also are self-organizing into preferred states and repeller states. Change is to be expected, even from preferred states, as variables in the system fluctuate over time. We see data consistent with the notion of attractor states. For example, with Gertrude, who had a high WTC-Trait score and called herself 'a talker,' we never see a dynamic WTC rating at or below zero. Each task, however, presented an opportunity for change in the system. For example, data for T2-education shows Agnes quickly entered what seems to be a repeller state, with rapidly declining WTC and incomplete task performance.

Agnes' dynamic WTC pattern leads us to comment on the fourth property of dynamic systems, non-linearity or threshold effects (sometimes called *the butterfly effect*). When Mary, Agnes, and Mabel recorded a rapid decline in WTC at the onset of a task, they abandoned it. They seemed to cross a threshold beyond which they were unwilling to communicate; the initial conditions are unfavorable for communication. Yet each of these three respondents' WTC recovered as the experiment presented new tasks, altering the initial conditions for the next communication event (task).

The notion of the butterfly effect proposes that: (i) small changes in one part of the system may have large effects in the overall system, but also that (ii) large changes in one part of the system may produce little change in the overall system. The research assistant reported that Mary's anxiety increased as her vocabulary troubles increased, but her dynamic WTC ratings remained consistently positive. Anxiety is an emotion that functions to alert the person to a potential threat (Reeve 2005). Threats, and the anxiety they produce, signal a

disturbance in the system. Therefore, it is interesting that Mary persevered in responding to the question as she found ways of coping with both the cognitive demands of the task and her anxiety. This leads us to propose that, on the one hand, disturbances in affect before a person begins speaking will more likely lead to avoiding the task entirely. On the other hand, affective disturbances in communication mid-stream seem to generate coping attempts.

Participants consistently engaged in metacognitive analysis of their language skill, and frequently mentioned awareness of the vocabulary level necessary for a task, relative to their own vocabulary. Agnes said that she 'should know' the vocabulary required to complete T8-directions, even if it was not coming to mind. Sue expressed the opposite feeling; she was surprised by how many food items she knew. This ongoing monitoring of competence helps to ensure communication accuracy, but it comes at a price. Because it consumes cognitive resources in working memory, it reduces the ability to search for new vocabulary and plan the next utterance.

## **Timescales**

There are at least four broad timescales that we can identify operating in this study, all of which are interesting from research, teaching, and learning perspectives. The first is long-term individual differences that are captured by questionnaire measures of extraversion, WTC-Trait, and language anxiety. These traits are built over a number of years. As characteristics of the person interact with the situational demands of participating in the study itself, we can identify a second timescale of  $\sim 1$  h. Participants came to a lab to be asked specific questions. This procedure locks down communication tasks and rigidly structures the interaction between the participant and research assistant. The communication tasks we used are consistent with discourse strategies involving teachers and students. Perhaps that is why none of the participants raised an objection to the question-answer sequence of the tasks (see Sinclair and Coulthard 1975). Other communication contexts or events are likely to alter the dynamic WTC patterns. The third timescale, operating on task-by-task basis, can be measured in tens-of-seconds. Even within tasks, however, a fourth timescale operates on a per second basis. This level of analysis is reflected in the fluctuating dynamic WTC ratings that combine influences from the long-term characteristics of the person, unique demands of the experimental situation, specific communication demands of task itself, and immediate experiences (such as forgetting a word or feeling a surge in anxiety). This per-second timescale produces considerable variation, as shown in the figures.

## **The idiodynamic method**

The method used in the present study is novel, therefore, some comments are necessary to understand where this research fits and its limitations. The

methodology relies on a convergence of self-reports (trait-level scores, dynamic WTC ratings, explanations by the participant, and the report of the research assistant). Self-report is known to have its flaws. A potential concern in studying WTC following communication events is bias in autobiographical memories which are episodic memories recalled long after their occurrence in an individual's life (Wolke 2008). These memories have been found to decline in frequency over time (Crovitz and Schiffman 1974) and are more likely to be viewed through an overly positive lens, due to the fading affect bias (see Ritchie *et al.* 2006). Such issues are rarely dealt with in qualitative research and it is difficult to account for these biases in self-report. The present study used brief tasks and immediate stimulated recall to reduce some biases, but face-saving or self-enhancement strategies likely are operating. However, as Gilbert (2006: 71) noted: '...of all the flawed measures of subjective experience that we can take, the honest, real-time report of the attentive individual is the least flawed'. Based on this rationale, we also chose to report the narrative descriptions of the research assistant who interviewed the participants, rather than using objective ratings. We recognize that sometimes the perception of anxiety in another person can be difficult, but human beings tend to be attentive to each other's emotional states *in situ*. Perhaps the WTC ratings and the self-report explanations are best considered to represent how the respondent understands their WTC, rather than simply being an unbiased recollection.

In general, time data are somewhat difficult to interpret. It takes time for the research assistant to pose a question, typically between 2 and 4 s. Yet we find changes in dynamic WTC ratings among participants even before they finish hearing the whole question (as we see in Mary's declining WTC as she hears the question about government). Some participants asked for clarification of a question or hesitated before responding. How should these delays be interpreted? A hesitation might indicate unwillingness to speak, but Mary told us that the time delay should carry the opposite interpretation; she was choosing from among several options to provide the highest quality response. Time data mixes the processes of hearing and interpreting the question, assembling the message, asking for clarification, hesitation before responding, and for some respondents, the time it takes to verbalize the intent to abandon the question. Using the idiodynamic perspective in the present study allows us to examine the complexity of time data and offer a more nuanced approach to the first research question than our correlation or ANOVA analysis can provide.

## Variations on the method

There are numerous avenues that might be taken in future research using this methodology. Given that our communication situation (eight specific, pre-ordered tasks) is different from everyday conversation, it would be interesting to study conversation between persons in the L2 and examine the

overlap in WTC ratings. Verspoor *et al.* (2008) presented a series of powerful analytic procedures for describing the graphical patterns that would allow for interesting comparisons of multiple intra-individual factors assessed on the same timescale, such as between conversational partners. The effects of experimental variations in the topic of conversation, the cultures or relative status of the interlocutors (e.g. peers vs. teacher), the relative language ability of the speakers, or the familiarity of the persons with each other (e.g. friends vs. strangers) could be studied using this method. Comparison of quality of responses in L1 and L2 (or L3, etc.) might also be conducted. This methodology might be integrated with teaching activities, for example testing new vocabulary use multiple times as students learn. Conversation topics can be varied systematically to focus on generating high or low levels of emotional engagement. The present study employed a consistent order of tasks because the research goals did not include evaluating the properties of specific L2 tasks. A consistent task order allows for patterns to be more easily discussed across persons.

Ratings of other affective variables (e.g. anxiety, confidence, anger, or frustration) might also be taken along with WTC or in its place. Quantitative, within-subject analyses could examine the correlation among different variables. Rising or falling trends for WTC can be examined within a person doing the same task at different times. Time series analyses could be used to tease out the stable individual differences from the moment-to-moment fluctuations. The methodology might also be applied to developing classroom-based activities that optimize an individual's learning or communication experience by assessing ongoing reactions to changes in tasks.

In considering potential future uses of this methodology, care must be taken to understand the nature of the communication situation. The procedure described in this study will not lend itself to all research applications. Often, discourse changes rapidly and smoothly as communication takes its natural turns. It is important to ask whether being recorded, either on audio or video, and whether knowing in advance that one will be rating her or his recording, will alter the situation sufficiently to produce a qualitatively different type of communication event. The present study is analogous to an oral exam's question-and-answer format, and respondents were aware that they were part of a research study. Within that situation, the methodology makes sense. It is an open question to ask how respondents' verbal, nonverbal, and affective behavior (including WTC) would change in response to similar questions from an interlocutor in a classroom or as part of an informal social setting.

Finally, although we have approached the study from a qualitative standpoint, quantitative applications of the methodology are both possible and recommended. For example, physiological measures of heart rate or skin response could be used with questionnaire data to predict the idiodynamic ratings of WTC, anxiety, or other factors. WTC ratings could be correlated with

systematic ratings of verbal or nonverbal behaviors (e.g. repairs, vocal hesitations, eye gaze) made by observers. The method can be applied to qualitative, quantitative, or mixed methodology research questions.

## CONCLUSIONS

WTC shows the properties of a dynamic system. We see that there are changes over time wherein each state is partially dependent on the previous state. We also see the interconnectedness of the linguistic, social, cognitive and emotional systems that produce WTC. When the systems function together to facilitate communication, we see WTC as an attractor state. When the systems interfere with each other, such as when vocabulary items are absent or a threat to self-esteem is detected, we see a repeller state where communication is abandoned. The sudden loss of WTC early in a communication event can produce dramatic effects. However, if WTC decreases after an event is underway, the effects might be minimal. This threshold property of dynamic systems helps to explain the absence of correlation between WTC and speaking time. This set of results highlights the difference between *beginning* and *continuing* to speak.

In closing we would like to revisit Allport. Adopting a neo-Allportian perspective, David Funder (2001: 23) argues that we tend to underestimate the complexity of the situation and the conflicting goals that people pursue within them.

As Freud taught us long ago, and the modern theorists of parallel distributed processing models of cognition teach us now, many different things are going on at the same time within the typical human head (and heart). We try to serve many masters, seek many goals at the same time, and life is a continuous struggle to balance them all and find some kind of workable compromise.

By examining WTC from an idiodynamic perspective, we can shed light on the many workable compromises that language learners make on-the-fly as they engage with the complexities of using someone else's tongue to communicate.

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## NOTES

- 1 The participants' names have been changed.

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