

# Complexity, Accuracy and Fluency: Toward a Conceptual Model of Communicative and Sociolinguistic Frameworks

複雑さ・正確さ・流暢さ：  
コミュニケーションと社会言語学枠組に基づいて概念的なモデルへ

Anthony S. Rausch\*  
ラウシュ・アンソニー

## Abstract

*This article furthers consideration of complexity, accuracy and fluency (CAF) begun in a previous paper by expanding the context of CAF from a second language acquisition CAF curriculum to a broader pedagogic curriculum, and in so doing, proposes a view of CAF that incorporates sociolinguistic theory and communication theory. The contents revisit the literature review of research on CAF, pointing first to the current focus of CAF as an assessment tool of task performance in highly controlled settings and then outlining initial attempts that have been made in re-defining, refining, and differentiating the varied constructs within CAF. The paper then briefly outlines and assesses attempts that have been undertaken to contextualize CAF on the basis of complexity theory. This expansion of CAF from use as an assessment tool or curriculum guide in developing learning tasks to a coupling with theory ultimately reveals how interconnected CAF is with constructs of communication and socio-linguistics theory. The paper closes by proposing that rather than attempting to develop CAF on the basis of complexity, more meaningful models can be constructed that incorporates specific potential communicative and sociolinguistic frameworks.*

**Keywords:** complexity, accuracy and fluency(CAF), communication theory, sociolinguistics

## 1. Introduction

A previous paper by Rausch (2012) opened by noting that ‘accuracy, fluency and complexity constitute a fundamental language and communicative triad that influences language use in any circumstance, but one that presents particular difficulties for foreign language users, particularly in the realm of speaking’ (87). This paper will continue with a focus on this very important and very contemporary component of language learning and use, considering further the empirical and theoretical debates that currently constitute much of the research in this area, before turning to considerations of how the current focus of CAF research, predominantly language use assessment through measures of task performance, may be reconceptualized and thereby expanded not only to

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\*弘前大学教育学部  
Hirosaki University, Faculty of Education

more broadly contribute to second language acquisition but also to contribute to and benefit from socio-linguistic and communication research and theory. Such a reconceptualized treatment of accuracy, fluency and complexity reflects its fundamental importance in any communicative endeavor and would thus ideally be more comprehensive, addressing all three elements combinatively, as well as being pedagogically, analytically and aesthetically complete, in that it would cover the full potential and variation of language in the communicative process. However, while recent research has attempted to connect CAF with more comprehensive theories, this paper will conclude by noting that theorization of CAF in fact would incorporate multiple elements from communication and sociolinguistics theory.

The previous paper first took up a consideration of the connections, trade-offs and transferability inherent in accuracy, fluency and complexity in language use and then outlined the ubiquitous focus (and criticisms thereof) in the current research in this area between these three elements and task-based assessments and task-based learning. Tasks have been proposed as the primary means of undertaking accuracy-fluency-complexity assessments and task-based learning is viewed by some as the primary pedagogical approach offered to accommodate the complex nature of accuracy, fluency and complexity as an element in second language learning. The previous paper problematized the three elements on an intuitive basis, identifying how a focus on any one element of the triad yields an influence on the other two, concluding that pedagogically overcoming such trade-offs could be found in an ‘extended reading aloud’ approach that emphasizes reading passages aloud as a task, together with repetition and transfer, which combinatively provided a means to balance the trade-off effect between the three elements. Such a ‘reading task-repetition and transition’ approach is organized in such a way as to contribute to a systematic progression through, exposure to, and development of the three elements—accuracy, fluency, complexity—both in isolation and in combination. Repetition of various ‘read aloud passages’ was offered as a means of accounting for both accuracy and fluency, developed through multiple readings of same or similar passages, with transition offered as a means of addressing all three in combination, but with a focus on varying levels of complexity, as the content is transferred through different communicative genres at different complexity levels, thereby demanding different complexity variables. The present paper returns to the original paper in its starting point, re-considering the constructs themselves and the nature of the inter-connections and problematization of trade-offs that was explicated in that paper, before examining current research efforts to bring the accuracy-fluency-complexity triad to a broader and more theoretical state.

## **2. Revisiting the Constructs; Revisiting Performance; Revisiting Complexity**

In a re-appraisal of the purpose of research on complexity, accuracy and fluency, Pallotti (2009) opens with the following description:

The notions of complexity, accuracy and fluency (CAF) have been employed in a number of

studies on the acquisition and use of a second language, although they do not constitute a theory or a research program in themselves. They are dimensions for describing language performance, most frequently used as dependent variables to assess variation with respect to independent variables such as acquisitional level or task features (590).

Given the amount of research that CAF as a research area has been attracting over the past decade or so, this is a fairly conservative appraisal. Norris and Ortega (2009), thankfully, expand on this:

Arguably, the overarching purpose in using CAF measures is to shed empirical light on how the L2 develops, by documenting what parts of the interlanguage system change as acquisition unfolds, in what ways anticipated change proceeds, . . . Further, for scholars who work in the area of instructed SLA research, the primary reason for measuring CAF is to account for how and why language competencies develop for special learners and target languages, in response to particular tasks, teaching, and other stimuli, and mapped against the details of developmental rate, route, and ultimate outcomes.

My initial approach to CAF was also pedagogical, specially with an aim at the development of accuracy-fluency-complexity oriented teaching-learning materials. As alluded to briefly above, my intuitive sense of the pedagogical relationship between these three elements reflected a progression from accuracy, a language-centered focus on getting the vocabulary and syntax right, to fluency, a discourse-genre focus on getting to a comfortable and effective delivery of the content, and then to complexity, where variations both in how the content is taken up and in how the content is communicated reflect different language and communicative genre. My intuitive sense of a likely progression aside—from accuracy to fluency and the complexity—this paper will adopt the now-standardized terminology of ‘complexity, accuracy and fluency (CAF),’ as first used in the *Applied Linguistics* special issue on the subject (30/4). And while I initially accepted this terminological shift grudgingly, I have come to appreciate how this ordering, in fact, actually reflects the more sociolinguistic and communicative viewpoint that this paper will ultimately argue – a viewpoint that extends well beyond that of Pallotti, Norris and Ortega as referred to above.

### *CAF Constructs*

The starting point for elucidation of this broadening of the expanse of CAF from assessment tool to curriculum guide, and further from consideration as a CAF curriculum to a theory that speaks to sociolinguistics and communication theory, can be seen in Pallotti’s (2009) reconsideration of the respective components of CAF. Accuracy is described as the simplest and most internally coherent construct of CAF, simply as the degree of conformity to certain language usage norms, primarily in the areas of lexicon and grammar. However, Pallotti points out not only that Bley-Vroman’s (1983) work on ‘comparative fallacy’ renders accuracy per se as insufficient as a direct indicator of

interlanguage development, but also that ‘accurate’ at a particular level does not necessarily equal ‘communicatively effective.’ This is clear when the perfectly ‘accurate’ sentence ‘*Colorless green ideas sleep furiously*’ (or something similarly ‘correct’ yet less than clear in its real-world meaning or relevance to the topic at hand) is compared with the ‘inaccurate,’ but fully-comprehensible and inherently more meaningful ‘*I no want go dance*’ (which could be contrasted with an alternative similarly-incorrect but perfectly-meaningful message: ‘*I NO want do dance*’). Turning to fluency, this is likewise usually offered with minimal consideration, as ‘the capacity to produce speech at normal rate and without interruption’ (Skehan 2009: 511) or as ‘the production of language in real time without undue pausing or hesitation’ (Ellis and Barkhuizen 2005: 139). However, as Pallotti points out, both of these descriptions again imply normative reference with no consideration of circumstance, and without specifying the referential group or sub-cultural influences, and overlooking sub-dimensions such as intentional speed variation, breakdown and the nature of the breakdown, as well as attempts at repair and character of that repair. Adjustments from fluency toward what would usually be considered stilted can render a message more meaningful, as in the clearly enunciated set of single words rendered: ‘*I-do-not-want-to-go-to-that-party,*’ rather than the more fluent and certainly more pleasant ordinarily spoken pattern of refusal. Finally, Pallotti prefaces complexity with the admission that the polysemous nature of the term makes it the most problematic construct of the three for research purposes. Not only does the term refer (potentially) to properties of both tasks in and of themselves and performance of tasks, complexity can refer to various elements within both task and performance. Task performance reflects, at a pre-linguistic stage, an understanding of the characteristics of the task itself, specifically to what degree the task may be pre-determined or open-ended, an appraisal and understanding of the content that makes up the task, a determination of the best way to achieve a communicative objective or alternatively an appraisal of the objective, all of which leads to the speaker making decisions about what elements to include and exclude in the task and how to proceed with the task. Viewed on this basis then, complexity in the language and communication of task performance include lexical, interactional, propositional, and grammatical complexity.

### *CAF Performance*

Further elucidation of this broadening of the expanse of CAF can be found in Skehan’s (2009) outline of the characteristics of successful language performance in task-based assessment contexts. This constitutes the performance assessment paradigm of CAF: error avoidance signaling *accuracy*; language production at normal rate and without inappropriate hesitation and pauses signaling *fluency*; and advanced language signaling *complexity*. This normative perspective, as presumably measured against native speaker performance, reflects the use of CAF as a measure of the character of language in use in specific tasks. The reality of the three elements in task performance is, as was intuitive in my early thinking, that there are trade-offs among the three dimensions. This was initially theorized as being due to the fact that committing attention to one area causes lower performance

in another, yielding what is called the Trade-off Hypothesis. While the idea of trade-off is initially highly intuitive—a focus on content complexity should compromise grammatical accuracy and speaking fluency, a focus on grammatical accuracy should compromise focus on content complexity and speaking fluency, and a focus on speaking fluency should compromise both the complexity of content communicated and the grammaticality of the language (Rausch 2012; 91)—more rigorous empirical findings point to various combinations that emerge depending on the nature of the task. As summarized by Skehan (2001, 2009): personal information exchange tasks tend to favor accuracy and fluency, but compromise complexity; narrative tasks tend to favor high complexity, with accordingly lower levels of accuracy and fluency; and pre-task planning yields greater complexity and fluency, with negligible effect on accuracy. Such findings yield broad generalizations as follows: tasks that are based on concrete or familiar information advantage accuracy and fluency; tasks containing clear structure advantage accuracy and fluency; interactive tasks advantage accuracy and complexity; tasks requiring information manipulation lead to higher complexity; and post-task conditions such as transcription raise accuracy (Skehan 2001, 2009). The semantic shift in focus from ‘compromise,’ as in ‘compromise of a performance characteristic,’ to ‘advantage,’ as in ‘advantaging of a performance characteristic,’ along with the empirical data showing the trends between task characteristics and performance improvements in specific performance combinations, led to development of a Cognition Hypothesis, which holds that various task characteristics might contribute to a shifting, whether conscious or unconscious, of cognitive resources that contribute to improved performances in certain CAF profiles. These generalizations are summarized in Figures 1 and 2.

Figure 1 Increases from the Viewpoint of Task Characteristics

<b>Task Characteristics that reflect:</b>	<b>yield Increases in:</b>
information manipulation, narrative reporting	Complexity performance
post-task activity (transcription)	Accuracy performance
interactive	Complexity + Accuracy
pre-task planning	Complexity + Fluency
concrete and familiar information, clear structure	Accuracy + Fluency

Figure 2 Contrastive Increases

<b>Pre-task planning:</b> increases in complexity + fluency	versus	<b>Post-task reflection (transcription):</b> increases in accuracy
<b>Familiar information:</b> increases in accuracy + fluency	versus	<b>Information manipulation:</b> increases in complexity
<b>Narrative structure:</b> increases in complexity	versus	<b>Interactive activity:</b> increases in accuracy + complexity

### *CAF Complexity*

The fact that Cognition Hypothesis seems to better reflect the empirical reality of task performance

than the notion of trade-offs points to the idea that something more is happening in such task performance than the simply act of stimulus-response language production. Clearly the speaker is doing something; clearly the speaker is engaging in not just a language task, but rather a communicative task. The speaker is assessing the character of the task and producing a performance reflective of those characteristics – a performance that advantages various combinations that are perceived to yield success in a specific task. Framed pedagogically, this relationship implies that while carefully designed learning or assessment tasks can force learners to engage with different combinations in the CAF triad, questions remain not only regarding how to theorize, and operationalize this reality, but also about how to overcome the specificity element and bring CAF to its potential in fully natural, realistic and non-deterministic speaking encounters. Ultimately, linguistic performance must be viewed as multi-faceted in its relationship to real-life communicative circumstances. In this sense, Pallotti expresses surprise as to how few CAF studies consider the communicative success of the tasks and learners investigated. This is then the point of departure from CAF simply as an assessment tool; it is the starting point for a view of CAF not only as a pedagogical anchor, the basis of a curriculum that demands accuracy of language, fosters fluency of delivery, and encompasses complexity of both content and communicative context, but also advances this under a highly complex and multi-dimensional rubric, with complexity as a consideration of the content and the context, then accuracy as the task is transferred to its syntactical domain, and then fluency as the communicative act itself.

### **3. Advancing a Broader Potential for CAF**

That the dominant research trends in CAF have seen a shift from Trade-off Hypothesis to Cognition Hypothesis reflects the intense and focused research that has been undertaken on CAF and performance; however, there are those who assert that CAF still fails to capture the reality of language use, as was outlined in a previous section of this paper and above, and therefore seek a broader theoretical viewpoint.

#### *A New Construct*

In response to this realism gap in the CAF research to date, Pallotti (2009) offers the notion of adequacy as both a dimension that allows for interpretation of the variance in CAF measures themselves on the one hand, while also being theoretically independent from CAF and capable of contributing understanding to the overall communicative endeavor on the other hand. As for the interpretation of CAF measures (the former dimension), adequacy offers a way out of an unquestioning ‘higher is better’ assumption regarding the specific numerical measures of complexity, accuracy and fluency. As an example in the realm of complexity and accuracy, in contrast to linear increases in complexity being equated with better performance, there are more numerous and more complicated factors to consider and variation and inclusion of what might be considered questionable forms can indicate higher sociolinguistic competence. First of all, there is the question of stylistic

choices, which are not to be confused with lack of competence. Second, there the reality of a dynamic complexity curve for many linguistic tasks. As second language learners increase their experience with the target language, for many tasks their complexity levels will decrease, a reflection of their increased ability to both assess, identify and eliminate elements that may be unnecessary in the communicative performance and thereby show a manipulation of the language toward greater efficiency without loss of communicative effect (Pallotti and Ferrari 2008; cited in Pallotti 2009). This mirrored Ortega's (2003) assessment that, 'progress in a learner's language ability for use may include syntactic complexification, but it also entails the development of discourse and sociolinguistic repertoires that the language user can adapt appropriately to particular communication demands' (494), some of which yield shorter and more compact, but highly communicative utterances. There are similar dimensions for fluency, where high speed could, in some contexts, hinder effectiveness, whereas slower speed with emphatic breaks placed on the basis of the objective, could enhance effectiveness on the basis of psycholinguistic (Chafe 1994) and interactional characteristics (Goodwin 1981). In the case of the latter, 'as a performance descriptor, adequacy represents the degree to which a learners' performance is more or less successful in achieving the task's goals efficiently' (Pallotti 2009; 596). This means that despite limited performances on specific measures of complexity, accuracy or fluency, a communicative act might be effective in total. Pallotti concludes her re-consideration of CAF by stating that while CAF measures are a good starting point for describing linguistic performance in its multi-dimensionality, in terms of the appropriateness to communicative goals and situations, adequacy is a necessary additional construct.

### *CAF and Theory*

As outlined in the earlier paper by the author, Larson-Freeman (2006) viewed fluency, accuracy and complexity as emergent properties in language development, with patterns in interlanguage a function of influences from both first and second language experiences. This is followed by Larsen-Freeman (2009) asserting that CAF has reached the point where reductionist approaches to language study, those taking factors one by one in attempts to identify their relationships with acquisition and performance in a linear way, do little to advance understanding of CAF at a broader and more reality-based level. Not only do the constructs of complexity, accuracy and fluency not operate in complete independence of each other in either abstract theorizations or empirical findings (as outlined above), CAF performance as both independent constructs and constructs in combination depend to a significant degree on the individual engaging in the performance and the context of the performance, meaning that patterns between learners are questionable in their relevance to advances in the field. The logical conclusion of such assertions, summarized by views of language development and performance as complex, nonlinear, dynamic, and socially-situated, are to seek a new perspective to guide CAF research; Larson-Freeman (2009) finds it in dynamic or complex systems and chaos/complexity theory.

Larson-Freeman and Cameron (2008) outline their complex systems approach for applied linguistics as based on such generalizations as language being ‘a dynamic system that emerges and self-organizes from frequently occurring patterns of language use’ (111) and that the emergent and self-organizing properties transpire on different levels – the individual, the interacting pair, various speech communities – and on different timescales – milliseconds of neural connections, minutes and hours of conversation and speech, hundreds of years as speech communities evolve. In this view, discourse, as language use in interactive communicative endeavors, is not a culmination of individual contributions, but rather a shared trajectory over time, with such co-construction of language in use signaling broader social construction at work. Paterson (2012) adopts a similar theoretical viewpoint, but offers a slightly different framework and a different set of terminological anchors: language as a Complex Adaptive System (CAS). According to this view, language should be thought of as ‘an open system that is made up of many individuals and types of individuals that are all interacting in various and complex ways such that the system is in a constant state of flux’ (27). Paterson is highly explicit in connecting the abstractness of CAS with concrete language dimensions: as official language when applied to the language of one’s country of origin versus a sociolect, that based on the similarities in the language use of a community of individuals and an idiolect, the patterns in the language use of an individual over the course of a lifetime. The characteristics of language as a Complex Adaptive System are offered as distributed control and collective emergence, intrinsic diversity, perpetual dynamics, adaptation through amplification and competition of factors, phase transitions, sensitivity to and dependence on network structures and a connection to location. To quote Paterson (2012) at length:

(1) language is an open system made up of a wide variety of idiolects and sociolects that interact through process of socialization, and are CAS’s themselves. Language users can exert varying degrees of influence on the system, but this influence is generally limited to their local surroundings. Attempts to control language systems generally fail, instead change emerges from the bottom-up. Languages are constantly changing, and evolving over time in a nonlinear fashion due to social, political, technological, philosophical, and other influences, and these can cause period of relative stability to periods of rapid change (34).

A summary of the concept of language as a CAS by Beckner et al. (2009) offers the following:

Language as a CAS involves the following key features: The system consists of multiple agents in speech communities interacting with one another. The system is adaptive; that is, speakers’ behaviour is based on their past interactions, and current and past interactions together feed forward into future behaviour. A speaker’s behavior is the consequence of competing factors ranging from perceptual constraints so social motivations. The structures of language emerge from interrelated patterns of experience, social interaction, and cognitive mechanisms (1-2).



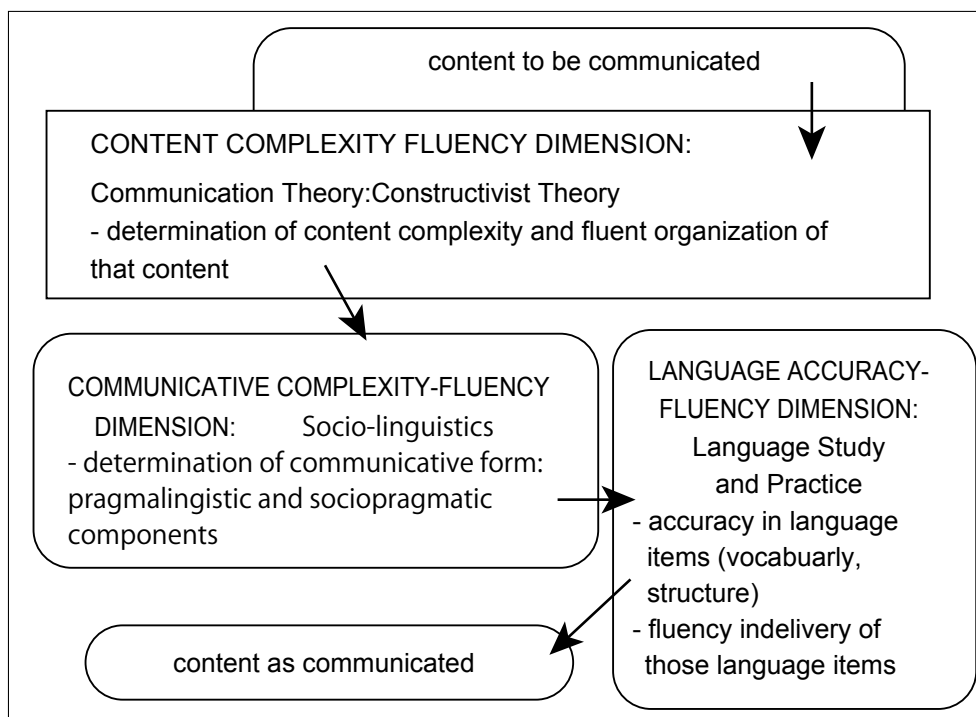
Such attempts to do more with complexity, accuracy and fluency (CAF), whether on a pedagogical or a theoretical level, are well founded and well-intentioned. Not only are the gaps that have emerged between the intuitive and the empirical unexplained, but a combinative approach that seeks to cover the full lexical and communicative extent of something as important as language use begs for connections to theory. However, clear questions remain about the foundation, contours and even the objectives and feasibility of such connection to theory. The work of Larsen-Freeman and Cameron (2008) has been criticized by Gregg (2010) as lacking the rigor necessary to provide for the transition and application of a well-established scientific theory to the area of language; he questions whether these theories can ultimately be applied to the cognitive and social sciences. Paterson's proposal to view language as a Complex Adaptive System appears more organized, if for no other reason than the inclusion of adaptation as a central tenet. However, when reading the work of both Larson-Freeman and Cameron and Paterson, theorization regarding macro-linguistic community level of analysis ultimately obscures the very real and very important processes taking place within CAF at the individual and communicative level—the processes of complex, accurate and fluent language production and use that make CAF a meaningful construct in language study and language learning. While theory must account for macro-level changes language use in broader society, it must not lose sight of the individual level of language production. Indeed, more detailed analysis of what is actually happening in the separate components of CAF, the separate dimensions of complexity, accuracy and fluency, reveals more complexity in each of these dimensions than is often acknowledged. Finally, at both levels, the level of individual language production as well as the macro-level of language evolution, I would argue that the theorization necessary to further investigate what is take place exists and can be found in cross-disciplinary associations between CAF research and what communication theory and socio-linguistics can offer.

#### **4. Implications: (Re) Connecting across Research Disciplines through a Conceptual Model**

The concluding idea of the previous section was that efforts to connect CAF to existing theoretical models based on notions of complexity overlook the reality that the explanations for the multi-dimensional and admittedly complex elements of CAF already exist, in the disciplines of communication theory and socio-linguistics. Thus, rather than viewing CAF in calls for connection to complexity theory, CAF should be viewed as a conceptual and pedagogical bridge that can bring the understanding of communication and socio-linguistic theory to the otherwise language-focused 'accuracy-oriented' efforts of the learner and guide research into focusing more attentively to processes taking place with the existing CAF triad. If the viewpoint shifts from a narrow focus on language learning and second second-language acquisition to a broader view of communication and communication in a second language, then, as pointed out by Larsen-Freeman, the reductionist measures outlined above do prove insufficient. Indeed, not only do complexity and fluency shift from strict language orientations to communicative orientation and from being dependent variables to determining variables, they also reveal themselves to be multi-dimensionally combinative. As

shown in Figure 3, at the initial end of the CAF continuum are questions of content, where content complexity is revealed more accurately as a 'content complexity-fluency dimension,' which deals with determination of content complexity and organization of this complexity into a fluent language form, all of which is addressed through Constructivist Theory. While Constructivist Theory itself explains the relationship between cognitive complexity (an outcome of content complexity and formation in a fluent form) and interpersonal communication competency (Delia, O'Keefe and O'Keefe 1982), the notion of a personal construct as the interpretive scheme by which an individual makes sense out of reality must be mitigated by socio-linguistics notions of pragmatic fluency in the middle section of the conceptual model, a 'communicative complexity-fluency dimension.' It is in this step that pragmalinguistic components related to such strategies as directness (versus indirectness) and the routines and forms that intensify or soften communicative acts, along with sociopragmatic sense elements enabling identification of social distance and power and the notion of rights obligations and imposition take on importance (Kasper 1997). This determination of content complexity and fluency, followed by communicative genre selection and recognition of pragmalinguistic and sociopragmatic considerations, follows Levelt's (1989, 1995) formulation of the transition in speech production from the Conceptualizer stage to the Formulator stage, the latter which then addresses lexical, grammatical and phonological encoding, identified as the 'language accuracy-fluency dimension' of CAF in Figure 3.

Figure 3 Communication and Socio-linguistic Theory in CAF



To close, clearly CAF offers potential for further research both pedagogically and theoretically. However, neither pedagogic aims nor theoretical aims are served by attempts to connect CAF to existing theories of scientific complexity or biological adaptation. Rather, this potential is to be found in focusing more closely on the elements of complexity, accuracy and fluency themselves, noting that they are multi-dimensional, but also that this multi-dimensionality may be well served by existing communication and sociolinguistic theory.

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## References

- Beckner, C., Ellis, N. C., Blythe, R., Holland, J., Bybee, J., Ke, J., et al. 2009. Language is a complex adaptive system: A position paper, *Language Learning*, 59 (Suppl. 1): 1-26.
- Bley-Vroman, R. 1983. The comparative fallacy in interlanguage studies: The case of systematicity, *Language Learning*, 33: 1-17
- Chafe, W. 1994. *Discourse, Consciousness and Time*. University of Chicago Press.
- Delia, J. G., O'Keefe, B. and O'Keefe D. 1982. The constructivist approach to communication, in F. Dance (ed) *Human Communication Theory*, Harper and Row.
- Goodwin, C. 1981. *Conversational Organization: Interaction Between Speakers and Hearers*. Academic Press.
- Gregg, K. R. 2010. Review article: Shallow draughts: Larson-Freeman and Cameron on complexity, *Second Language Research*, 26 (4): 549-560.
- Kasper, G. (1997). *Can pragmatic competence be taught?* National Foreign Language Resource Center, Honolulu: University of Hawai'i, Second Language Teaching & Curriculum Center. Retrieved 7 June 2010 from: <http://www.nflrc.hawaii.edu/NetWorks/NW06/>
- Larson-Freeman, D. 2006. The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English, *Applied Linguistics*, 27/4, 590-619.
- Larson-Freeman, D. 2009. Adjusting expectations: The study of complexity, accuracy, and fluency in second language acquisition, *Applied Linguistics*, 30/4: 579-589.
- Larson-Freeman, D. and Cameron L. 2008. *Complex Systems and Applied Linguistics*. Oxford University Press.
- Levelt, W. J. M. 1989. *Speaking: From intention to articulation*. MIT Press.
- Levelt, W. J. M. 1995. The ability to speak: From intention to spoken words, *European Review*, 3: 13-23.
- Norris, J. M. and Ortega, L. 2009. Towards an organic approach to investigating CAF in instructed SLA: The case of complexity, *Applied Linguistics*, 30/4: 555-578.
- Ortega, L. 2003. Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level L2 writing, *Applied Linguistics*, 24: 492-518.

- Pallotti, G. 2009. CAF: Defining, refining and differentiating constructs, *Applied Linguistics*, 30/4: 590-601.
- Paterson, A. 2012. Language as a complex adaptive system, *Akita Daigaku Kyoiku Bunka Gakubu Kenkyu Kiyō*, 67: 27-36.
- Rausch, A. 2012. Fluency, accuracy and complexity: From concept to curriculum, *CROSSROAD Journal of Educational Research*, 16: 87-94.
- Skehan, P. 2001. Tasks and language performance, in M. Bygate, P. Skehan, and M. Swain (eds): *Research Pedagogic Tasks; Second Language Learning, Teaching and Testing*. Longman.
- Skehan, P. 2009. Modelling second language performance: Integrating complexity, accuracy, fluency and lexis, *Applied Linguistics*, 30/4, 510-532.

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