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Access Fluidity, Attention Control, and the Acquisition of Fluency in a Second Language

NORMAN SEGALOWITZ
Concordia University
Montréal, Québec, Canada

Any comprehensive account of second language acquisition (SLA) will necessarily include levels of analysis ranging from consideration of processing skills at the level of single words and their constituents all the way to message construction involving pragmatic, sociolinguistic, and discourse conventions. Each level of analysis will involve its own units of measurement and special theoretical considerations. Despite these differences between levels, however, one issue of interest to most SLA researchers cuts across all levels of analysis—*fluency,* understood here as referring to those aspects of productive and receptive language ability characterized by fluidity (smoothness) of performance. For example, one can ask what learning conditions enhance an English language learner's ability to fluidly (fluently) link a word to its meaning, process a grammatical construction, or understand the use of irony or sarcasm. In the sense used in this article, fluency manifests in language performance as speaking or reading at an appropriate rate, speaking without undue hesitation or pauses, comprehending rapidly presented oral or written language, and the ability to perform under a range of social and physical circumstances. This article addresses some of the cognitive issues that underlie learners' successes and failures in achieving high levels of fluency.

The central premise of the ideas described in this article is that successful second language (L2) mastery requires more than knowledge of phonology, vocabulary, syntax, semantics, pragmatics, sociolinguistic conventions, and sensitivity to cultural norms. The successful L2 user must also be able to implement that knowledge in an appropriately fluent manner. Put another way, the cognitive machinery (i.e., the underlying cognitive processing) that translates knowledge (whatever its form) into action must itself function efficiently if observable language performance is to be judged fluent. The questions addressed in this article are these: How can one measure this cognitive fluency? Can such measures be useful to the larger SLA research enterprise?

This brief article focuses on just two aspects of cognitive fluency. The first is *access fluidity*—the process of connecting words and expressions to their meanings (often referred to as *lexical access*), a necessary component of fluid speaking, reading, and listening. The second is *attention control*—the process by which a language user focuses and refocuses attention in real time as the message being communicated unfolds (more on this later).

ACCESS FLUIDITY

How can one know if a person is exhibiting a relatively high level of access fluidity in connecting words to their meanings? One standard measure is speed of processing as observed in simple *reaction time* (RT) judgment tasks. In lexical decision tasks, RT is the amount of time a person takes to decide whether a string of letters constitutes a real word. In semantic

classification tasks, RT is the amount of time a person takes to decide whether a word names an object in a particular category. In both cases, it is assumed that one has to connect the symbol (the written or auditory stimulus) to its meaning and that the speed of the response reflects, among other things, the cognitive fluency underlying the process of making this connection. It turns out, however, that matters are not so straightforward. Simple processing speed is, by itself, a relatively uninteresting feature because it is purely relative; people who are truly nonfluent might nevertheless be labeled as fluent in one situation but not another depending on what the comparison group is. A more intuitively appealing approach is to ask whether access in a given case reflects *automatic processing,* that is, unstoppable or ballistic linking of symbol to meaning.

Favreau and Segalowitz (1983) used a variant of the lexical decision task with highly fluent and somewhat less fluent L2 readers, in a design that examined whether comprehending word meaning was automatic (unstoppable). They found that all participants exhibited unstoppable processing in their first language (L1) but only the very highly fluent L2 readers (those able to read L1 and L2 equally fast) exhibited unstoppable processing in the L2, whereas they were not significantly faster on baseline trials. These results suggest that automatic processing, and not speed of processing as such, was associated with fluency.

Another way to think about access fluidity is to ask how efficient or noise free the processing is. By analogy, access fluidity can be thought of as reflecting the smoothness of flow of mental traffic as one moves from point A to B (e.g., from symbol to meaning). If there are many interruptions in this flow (due to the mental equivalent of traffic jams, interruptions from cross traffic, losing one's way, etc.), then not only will the journey from A to B be relatively slow, but it will be highly variable, taking more time on some occasions and less time on others because of the variable nature of the interruptions. This situation contrasts with the normally faster flow that should occur when the routes are free of all other traffic (noise free). Flow might, nevertheless, be slow even in noise-free situations if the basic processes (analogous to vehicles in the traffic analogy) are themselves inherently slow. Segalowitz and Segalowitz (1993) proposed that the coefficient of variation (CV) of a person's RT in a judgment task could serve as a useful measure of the degree to which the processing is noise free (see Segalowitz, 2003; Segalowitz & Hulstijn, 2005). The CV measure captures the fluidity of mental flow that can be distinguished from simple speed of processing. Segalowitz and Freed (2004) and Segalowitz and Frenkiel-Fishman (2005) report applications of the CV measure in studies of L2 fluency.

ATTENTION CONTROL

Cognitive fluency must involve more than access fluidity, however, because communication requires more than simply linking single words to their meanings. The meanings of complex messages are constructed in real time as these messages unfold. To cast the issue in cognitive linguistic terms (Langacker, 1987; Talmy, 2000a, 200b), language itself can be seen as an *attention-directing device,* where elements of language direct the recipient to construct a meaning reflecting the sender's construal of the situation. For example, the sentence *The man stood under a window* conveys one construal of a scene and *There was a window right above where the man was standing* conveys another, although both roughly describe the same scene.

Function words and other grammatical devices (e.g., *the, under, right above*) play important roles in creating this difference. As these sentences unfold over time, the receiver has to direct attention to the relationships between the meanings evoked by *man, stand,* and *window.* Fluent processing of the message will thus involve continuous focusing and refocusing of attention on the relationships among meanings (in addition to accessing the primary meanings of the content

words). Cognitive fluency involves controlling these shifts of attention in an efficient manner. In recent years, cognitive psychologists have devised various ways to measure attention shifting ability. The *alternating runs* paradigm used by Rogers and Monsell (1995) is one such technique. In the paradigm's standard form, the participant makes a series of judgments under two different task sets, alternating from Task A to Task B in the sequence AABBAABB.... Even numbered trials require a repeat of a given task (A to A, or B to B) with no need to shift attention to the other task set. Odd numbered trials require a shift to the other task set (from A to B, or B to A). The result is a sequence of alternating shift and repeat trials. Typically,RTs on shift trials are slower than on repeat trials, and this *shift cost* (also often called a *switch cost*) reflects the burden on the attention system of having to make a shift.

Taube-Schiff and Segalowitz (2005a) used the alternating runs design to study attention shifting in L1 (English), governed by relation words embedded in short sentence fragments (e.g., … *all alone above the spot* …). Taube-Schiff and Segalowitz (2005b) extended this research to include a less fluent L2 (French). They found that when the task set involved judgments about content words (*truck, boat*), all participants revealed similar shift costs in L1 and L2. However, when the task set involved judgments about relation words (*under, near*), participants showed shift costs in both languages, but they showed a significantly larger shift cost in the less fluent L2. Taube-Schiff and Segalowitz interpreted their results to mean that attention control is linked to fluency only when the attention-directing aspect of language is engaged (as with relation words but not content words). Relation words, then, can pose a challenge for L2 learners' attention control (see also Slobin, 1997).

ACCESS FLUIDITY, ATTENTION CONTROL, AND THE LARGER SLA RESEARCH ENTERPRISE

The measures of access fluidity and attention control just described can be especially interesting for psycholinguists and cognitive psychologists. These measures are relatively easy to obtain in the laboratory. They may, however, also be of use to the wider SLA research community. It is reasonable to assume that a person normally develops high levels of access fluidity and attention control only through extensive exposure to and practice with the target language in naturalistic communicative situations. Such fluency development contrasts with the acquisition of vocabulary or metalinguistic knowledge of grammar, which can be obtained through formal study. Measures of access fluidity and attention control can, therefore, be used as indices of learner experience in specific communicative situations. In principle, it should be possible to use measures of access fluidity or of attention control—with appropriate selection of stimuli, of course—in studies where the focus is the impact of pragmatic, sociolinguistic, or discourse issues on language acquisition. For example, one could compare the impact on language learning outcomes on qualitatively different types of communicative experience—say, intimate versus formal conversational experience—by monitoring the acquisition of cognitive fluency with particular target constructions (e.g., idioms or emotion-laden vocabulary). Thus, laboratory-based measures of cognitive fluency may be able to contribute to the broader study of SLA, and reciprocally, research addressing broader communicative issues in SLA may make important contributions to our understanding of how and under what conditions cognitive fluency develops.

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THE AUTHOR

Norman Segalowitz is Professor of Psychology at Concordia University, Montréal, Québec, Canada. His research focuses on the cognitive processes underlying adult second language acquisition and use. In particular, he addresses the roles that automatic and attention based processes may play in fluency development and the implications these roles may have for language instruction.

REFERENCES

Favreau, M., & Segalowitz, N. (1983). Automatic and controlled processes in the first and second language reading of fluent bilinguals. *Memory & Cognition, 11,* 565–574.

Langacker, R. W. (1987). *Foundations of cognitive grammar. Vol. 1: Theoretical prerequisites*. Stanford, CA: Stanford University Press.

Rogers, R. D., & Monsell, S. (1995). Costs of a predictable switch between simple cognitive tasks. *Journal of Experimental Psychology. General, 124,* 207–231.

Segalowitz, N. (2003) Automaticity and second language acquisition. In C. Doughty & M. Long (Eds.), *The handbook of second language acquisition* (pp. 382–408). Oxford: Blackwell.

Segalowitz, N., & Freed, B. F. (2004). Context, contact and cognition in oral fluency acquisition: Learning Spanish in at home and study abroad contexts. *Studies in Second Language Acquisition, 26,* 173–199.

Segalowitz, N., & Frenkiel-Fishman, S. (2005). Attention control and ability level in a complex cognitive skill: Attention-shifting and second language proficiency. *Memory & Cognition, 33,* 644–653.

Segalowitz, N., & Hulstijn, J. (2005). Automaticity in bilingualism and second language learning. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches.* (pp. 371–388). Oxford: Oxford University Press.

Segalowitz, N., & Segalowitz, S. J. (1993). Skilled performance, practice, and the differentiation of speed-up from automatization effects: Evidence from second language word recognition. *Applied Psycholinguistics, 14,* 369–385.

Slobin, D. (1997). The origins of grammaticizable notions: Beyond the individual mind. In D. Slobin (Ed.), *The crosslinguistic study of language acquisition*, vol. 5: *Expanding the contexts*, pp. 265-323. Mahwah, NJ: Lawrence Erlbaum Associates.

Talmy, L. (2000a). *Toward a cognitive semantics. Vol. 1: Concept structuring systems*. Cambridge, MA: MIT Press.

Talmy, L. (2000b). *Toward a cognitive semantics. Vol.2: Typology and process in concept structuring*. Cambridge, MA: MIT Press.

Taube-Schiff, M., & Segalowitz, N. (2005a). Linguistic attention control: Attentionshifting governed by grammaticized elements of language. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 31,* 508–519.

Taube-Schiff, M., & Segalowitz, N. (2005b). Within-language attention control in second language processing. Bilingualism: Language and Cognition*, 8,* 195–206.