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Fluency

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Fluency is a key component of second language (L2) ability. Yet, there is considerable debate on how best to operationally define *fluency*. Different authors define it differently; moreover, in some languages (e.g., French, Russian) the exact equivalent to the term *fluency* does not even exist. All this creates a challenge for researchers interested in L2 fluency: what exactly is one studying and how does one communicate this to colleagues from other linguistic communities? For most, the qualities that make speech fluent include fast speech rate, and the relative absence of undue hesitations, pausing, repetitions, and repairs. For some, fluent speech is also speech that is accurate, appropriate, and natural in terms of the conventions of language use. Each of these features, of course, may or may not prove to be linked to the others in a meaningful way, and so the utility of the construct *fluency* may itself be open to question. Important discussions regarding what may be meant by fluency can be found in De Bot (1992), Fillmore (1979), Kormos (2006), Levelt (1989), Kaponen and Riggenbach (2000), Schmidt (1992), and Segalowitz (2010).

Nevertheless, as with many scientific constructs, as work progresses in the field, the original natural language term has come to take on a more precise

meaning within the scientific community. While it might be overly optimistic to claim there is consensus, for purposes of this overview a useful formulation may be the following. Goldman-Eisler (1968), in addressing fluency issues in first language (L1) production, wrote, "the complete speech act is a dynamic process, demanding the mobilization in proper sequence of a series of complex procedures and is the temporal integration of serial phenomena" (p. 6). And further, she wrote, "Hesitation is thus shown to be an indicator of the internal act of generating information ... " (p. 57). In other words, behind the oral manifestations of fluency (the temporal characteristics of fluency) lie cognitive processes responsible for creating an utterance with its specific features of fluency. Taking a cue from Goldman-Eisler (1968) and others, a working definition of L2 fluency can be synthesized as follows:

> L2 fluency refers to the "features of L2 oral performance that serve as reliable indicators of how efficiently the speaker is able to mobilize and temporally integrate, in a nearly simultaneous way, the underlying processes of planning and assembling an utterance in order to perform a communicatively acceptable speech act".
>
> (Segalowitz, 2010: 47)

An important feature of the above definition is that it distinguishes between two sets of temporal phenomena, those of the observable features of oral performance—the *utterance fluency*—and those of the underlying processes responsible for the utterance—the *cognitive fluency*. Thus, the emerging definition of L2 fluency is one that identifies separate, operationally definable phenomena linking a speaker's utterance fluency to an underlying cognitive fluency.

Utterance fluency

Most research on L2 utterance fluency has focused on the features of oral production that differentiate more from less fluent speakers. In such research it is necessary, of course, to first independently distinguish the more fluent from the less fluent speakers in the first place. Many studies have attempted to do this by comparing L2 speakers with more versus less experience in the target language (e.g., by age of acquisition; length of study; number of years exposed to the language). Others have examined judgments by native-speaking listeners of the fluency levels the L2 users have attained (Derwing *et al.*, 2004). Other studies have compared L2 speech against the presumably more fluent L1 speech. The methods just enumerated may have intuitive appeal, but it is easy to see that they differ from one another in important ways and therefore may yield different results. Moreover, in order to avoid circularity, a method of distinguishing speakers of different fluency levels is needed that is independent of the speech features being examined. We will return to this problem below.

As for how to operationally define utterance fluency, the list of potentially interesting speech features to look at is relatively long (see, for example, summaries in Ellis and Barkhuizen, 2005; Kormos, 2006; Luoma, 2004). These features include speech rate (syllables per second), its inverse (milliseconds per syllable), silent pauses per minute (where silent pause has been defined variously as 200 msec, 250 msec or 400 msec of silence), filled pauses per minute (pauses containing ums, ers, etc.), mean length of runs (mean number of syllables between silent pauses), dysfluencies per minute (repetitions, restarts, repairs), measures of speech rhythm, etc. Studies by Lennon (1990), Towell *et al.* (1996), and by Iwashita *et al.* (2008) (among others) illustrate the range of measures used. A feature of the fluency literature is that no one measure has emerged as *the* best way to characterize fluency.

One important point to emerge from studies of utterance fluency is that it is necessary to take into account how the speech samples have been elicited. It turns out that it matters whether speech samples are taken from spontaneous speech, from reading samples, from story retelling, from tasks allowing or preventing pre-planning of what to say, from tasks that are simple versus complex, etc. This is because speakers can use many different strategies to cope with the demands of communicating in a non-fluent language (Dörnyei and Kormos,1998). The issue of how speech fluency characteristics reflect the way the speech sample was obtained and

the speakers' strategies is itself an important topic of study (see, for example, Robinson, 2001; Tavakoli and Skehan, 2005). The findings from such studies further complicate the study of fluency because they show that manifestations of fluency reflect, to a great degree, the conditions under which the speech samples have been obtained.

As a result of the multiplicity of operational definitions of utterance fluency, and the performance variability resulting from different speech elicitation techniques, and also the small sample sizes used in many studies, research on fluency has not always yielded consistent results. Part of the problem no doubt has been the large effort required to obtain measures from large speech samples, including the need to transcribe spoken samples and to make spectrographic measurements of various temporal phenomena by hand. Because of the costs, the study of large samples of participants can be impractical in many situations. However, in recent years new techniques have emerged that allow for some automated measurements of utterance features (Cucchiarini *et al.*, 2002; De Jong and Wempe, 2009) and this may help to make the study of large samples more feasible.

One recent study using automated speech analysis software (e.g., De Jong *et al.*, 2009) revealed that speakers' measures of speech rate and of silences were strongly correlated between the L1 and L2. This result underscores the need to keep in mind that, when searching for reliable and valid measures of L2 utterance fluency, there are individual differences between L2 speakers that do not reflect differences in proficiency as such but general individual differences in speaking. These differences will be reflected in the corresponding features of the speakers' L1. Thus, a good way to take this source of individual differences into account, and hence to remove a source of unwanted noise in the L2 fluency data, is to use L1 speech data as a control measure. To date, very few studies have attempted to do this, and this might be one of the reasons for the poor record of consistency between studies of L2 fluency (an issue that merits addressing in future research).

As mentioned earlier, most research on L2 utterance fluency is premised on the assumption that there exist underlying cognitive processes that are responsible for speech production. These processes themselves unfold over time; therefore they too can be characterized in terms of fluency considerations. This cognitive fluency is discussed in the next section.

Cognitive fluency

To date little empirical research has aimed at identifying the features of cognitive fluency that might underlie utterance fluency. Some theoretical accounts of speech production, however, do provide a basis for thinking about this. For example, the model of speech production proposed by Levelt (1989; De Bot, 1992) identifies a number of cognitive processes that underlie speech production. These include conceptualizing what is to be said, formulating the ideas to be expressed in a manner compatible with the specific requirements of the language, accessing word meanings from a mental lexicon, and encoding the information into appropriate phonological and articulatory codes. If any of these cognitive processing activities is highly inefficient, this could result in reduced oral fluency. A challenge for researchers, then, is to operationalize these various aspects of the underlying cognitive system in such a way that allows measuring cognitive fluency and relating this to utterance fluency.

One approach to doing this is to assess how *automatic* a given cognitive process is, under the assumption that automatic processing contributes to fluent utterance production. Here there are different ways of operationalizing what is meant by *automatic*, including speed of processing, stability of processing, the ballistic (unstoppable) nature of the processing, the effortlessness of it, etc. Another feature of cognitive fluency that is relevant to oral fluency is the flexibility of the underlying cognitive processing—that is, the ability to refocus attention as needed in order to keep the flow of speech smooth and fluid. Flexibility of attention control complements the automaticity of processing; the cognitive system underlying speech production should be both highly efficient (able to execute processing in a fast, effortless, automatic manner) but not so rigidly as to be unable to correct itself or

change direction without compromising the fluidity of speech.

One aspect of cognitive processing where automaticity may be important for utterance fluency is lexical access—linking words with meanings. Clearly, word-finding problems can compromise oral fluency. Other relevant considerations are the ability to process grammatical structure efficiently and to process fixed or formulaic expressions. Each of these can be characterized in terms of fluency—that is, in terms of their temporal characteristics—and this can be done in different ways (processing speed and stability; priming effects; etc.). This leads to a situation similar to the one described earlier for utterance fluency. Although any given measure of cognitive fluency may be of intrinsic interest to the researcher (e.g., the efficiency of word finding), a way needs to be found to help researchers decide which of the many possible measures of cognitive fluency will truly contribute to a larger theory of L2 fluency.

Bringing cognitive and utterance fluency together

Which of the many potentially useful measures of utterance and cognitive fluency should be the focus of research? Segalowitz (2010: 167) proposes two criteria for retaining measures for a theory of L2 fluency:

(1) Retain those measures of L2 utterance fluency (e.g., speech rate, hesitation rate) and of L2 cognitive fluency (e.g., processing speed, processing stability) that are L2 specific—that is, that take into account corresponding L1 baseline values.
(2) Retain those measures of L2-specific utterance fluency that are linked to L2-specific measures of cognitive fluency.

This proposal reflects the idea that utterance fluency reflects a speaker's underlying cognitive fluency in the planning and assembling of communicative acts. The idea is that in this way a set of operationally well-defined measures will emerge that can be said to usefully define what is meant by L2 fluency.

The bigger picture

Recent research results suggest that fluency and its attainment is more than just a matter of the efficient operation of cognitive and speech processes. One can ask questions about the neurophysiological mechanisms involved in L2 production fluency. Social, attitudinal, and motivational factors also enter into the picture (Dörnyei and Ushioda, 2009). In fact, it may be more appropriate to approach L2 fluency in a way that goes beyond piecemeal studies of cognitive and articulatory issues and to adopt a broader cognitive science framework (Segalowitz, 2010). This has the potential of raising new and exciting questions related to L2 skill acquisition in different contexts, in different populations, with implications for L2 fluency instruction.

See also: automaticity, intelligibility in SLA, pausology and hesitation phenomena, speech rate, units for analyzing L2 speaking, units for analyzing L2 writing

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