The Comparative Fallacy in L2 Processing Research

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[T]he comparative fallacy [is] the mistake of studying the systematic character of one language by comparing it to another. (Bley-Vroman, 1983, p. 6)

[I]n the words of Bley-Vroman (1983, p. 15), "the learner's system is worthy of study in its own right" (p. 4), "on the basis of [its] own 'internal logic'" (p. 15), "not just as a degenerate form of the target system" (p. 4). (Schwartz, 1997, p. 388)

1. Introduction

There are striking differences, both quantitative and qualitative, between native (L1) and nonnative (L2) linguistic behavior, for which any empirically adequate theory of L2 acquisition must account. During the 1980s and 1990s, a number of L2 researchers attempted to account for these differences by invoking fundamentally different grammatical representations. In its most compelling formulation, this idea was stated as Bley-Vroman's (1990) Fundamental Difference Hypothesis. However, since that time a number of empirical studies, grounded in clearly articulated poverty of the stimulus problems (see Schwartz & Sprouse, 2000a, b), have rendered the Fundamental Difference Hypothesis in its strongest form implausible. The new millennium is witnessing, like a new variation on an old theme, a number of processing studies which attempt to explain observed mismatches between mature native linguistic behavior and developing L2 linguistic behavior by invoking fundamentally different processing mechanisms (e.g., inter alia, Dussias, 2001, 2003; Felser, Roberts, Marinis & Gross, 2003; Papadopoulou, 2002, 2005; Papadopoulou & Clahsen, 2003).

The goal of this paper is to cast doubt on this approach. We contend that a closer examination of the methodologies and data of these L2 processing studies suggests a view where the fundamental mechanisms of L1 and L2 processing are the same. However, the general slowness of L2 processing (when compared to (mature) L1 processing) makes attempts at direct comparisons of native processing and nonnative processing potentially unrevealing. Furthermore, we will suggest that even some data that have been claimed to support non-syntactic processing by L2ers, upon closer inspection, support a view of L2 processing that is congruent with the same kind of structurally based processing used by natives. Throughout, we wish to emphasize the crucial methodological point stated in (1) (see also Juffs, 2006).

(1) *Crucial methodological point*
The mere fact that there is an observed non-isomorphy between natives and L2ers does ***not*** entail that the natives and the L2ers deploy fundamentally different mechanisms.

1.1 Reliance on Lexis and Defaults

Following much work on L1 sentence processing, many L2 processing studies investigate locally ambiguous relative clauses, as sketched in (2a) and (2b).

* We thank the GASLA 8 audience, in particular Jürgen Meisel, for engendering heartfelt discussion of our paper. Many thanks also to the GASLA 8 organizers, John Archibald and Mary O'Brien, for fostering such constructive engagement at an extremely enjoyable conference.

 Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006), ed. Mary Grantham O'Brien, Christine Shea, and John Archibald, 33-40. Somerville, MA: Cascadilla Proceedings Project.

(2) a. [... N1ϕ ... *of*/*with* [... N2 ...] [RC ... XPϕ ...]] N1 attachment
b. [... N1 ... *of*/*with* [... N2ϕ ... [RC ... XPϕ ...]]] N2 attachment

Here a superordinate NP, with head N1, properly contains a subordinate NP, with head N2. The subordinate NP may be in a genitival construction or may be the object of a "thematic" preposition, e.g. *with*. There follows a relative clause, which at first could in principle be construed with N1 or N2, until a disambiguating segment is reached. This invites the question whether L2ers process such relative clauses in the same way as natives do. This was investigated by Papadopoulou and Clahsen (2003) comparing native and L2 Greek, and by Felser et al. (2003) comparing native and L2 English. Both studies found that natives and L2ers had an N2 modification preference with the thematic preposition; by contrast, with the genitive, the L2ers—contra the natives—had no modification preference for N1 vs. N2, either in judgments or in reading times. These researchers account for this asymmetry by claiming that L2ers rely on lexical-thematic and contextual information rather than on syntax. For L2 Spanish genitives, Dussias (2003) found an L2 preference for N2 modification in judgment tasks but—contra what is found for natives—no effect in reading times. She claims that this is the result of L2ers deploying default strategies (e.g. local attachment).

1.2 Lack of Syntactic Detail

Marinis, Roberts, Felser and Clahsen (2005) investigated L1 and L2 processing of extraction. Consider (3a) vs. (3b), where the slash (/) indicates a new screen in a computer-based reading task:

(3) a. The manager ***who*** / the secretary claimed / **that** / the new salesman / had pleased / will raise company salaries.
b. The manager thought / the secretary claimed / **that** / the new salesman / had pleased / the boss in the meeting.

(3a) involves a relative clause whose head is extracted from the clause introduced by *that*; on standard assumptions, there should be a trace immediately following the verb *pleased* and an intermediate trace immediately preceding the complementizer *that*. (3b), on the other hand, involves no such extraction and hence no such traces. Marinis et al. compared reading times (RTs) on the third segment (*that*) for examples like (3a), where an intermediate trace belongs, with the third segment (*that*) for examples like (3b), where no such intermediate trace is syntactically motivated. The results show that natives had longer RTs on segment 3 when processing strings like (3a) than when processing strings like (3b), but that L2ers had no such difference in RTs. On segment 5 (*had pleased*), both natives and L2ers exhibited longer RTs for (3a) than for (3b). Marinis et al. conclude that L2ers' processing of cross-clausal dependencies does not rely on intermediate traces. The representations in (4) sketch the purported difference in the parses for (3a) by the natives vs. the L2ers.

(4) a. *L1ers' parse of (3a): Intermediate trace forced by phase-by-phase computations*
[$_{CP}$ *who* [$_{IP}$ the secretary claimed [$_{CP}$ *t* [$_{C'}$ that [$_{IP}$ the new employee had pleased *t*]]]]].
b. *L2ers' parse of (3a): No intermediate trace*
[*who* the secretary claimed that the new employee had pleased ___].

1.3 The Shallow Structure Hypothesis

Results of the type just discussed lead Clahsen and Felser (2006a, b) to their Shallow Structure Hypothesis, according to which L2ers' processing is syntactically shallower than natives' processing. Clahsen and Felser claim that whereas in native processing, a syntactic reflex mediates the integration of lexical-thematic, prosodic and contextual information, L2 processing—lacking syntactic detail—"over-relies" on lexical-thematic and pragmatico-contextual information, without the same degree of syntactic mediation. Although Clahsen and Felser do not explicitly say so, for them, the positing of a fundamental difference between (mature) native and (developing) nonnative processing of this type is

virtually a logical necessity. This is because they hold that "there is evidence that learners develop interlanguage grammars that are fundamentally different from L1 grammars (e.g., Bley-Vroman, 1990; Clahsen & Muysken, 1986, 1989)" (Clahsen & Felser, 2006a, p. 117). Thus, the "shallow processing" that Clahsen and Felser see as characteristic of L2 processing is really a necessary reflex of their view that L2 grammars involve "shallow representations."

We offer here three observations on Clahsen and Felser's (2006a, b) discussion. First, it is extraordinary that neither Clahsen and Felser's keynote article nor their responses to commentaries even mentions the strong refutations of Clahsen and Muysken's 1986 paper published 20 years ago, let alone the two decades of painstaking research showing that L2 grammars share with native grammars highly idiosyncratic and specific restrictions imposed by UG. Second, it is confusing that Clahsen and Felser invoke Bley-Vroman's very important (1990) paper in this context. Under the Fundamental Difference Hypothesis, the L1 grammar essentially substitutes for UG in guiding the development of L2 grammars. For Bley-Vroman, this is an issue of conservatism in learning. Thus, to the extent that Target Language structures can be described by the L1 grammar, these structures should receive a significantly detailed syntactic parse—not a shallow one. But now remember that the Shallow Structure Hypothesis was empirically motivated in Papadopoulou and Clahsen (2003) as a claim that L2 processing did not—generally speaking—exhibit L1 effects. Moreover, L1 effects were found in a study of relative clause attachment in L2 French (Frenck-Mestre, 2002), as would be expected on either Bley-Vroman's version of the Fundamental Difference Hypothesis (or Schwartz & Sprouse's 1996 Full Transfer/Full Access hypothesis). Third, even if we dismiss Clahsen and Felser's claims about shallow L2 grammatical representations, were they indeed to have evidence that L2ers' sentence processing is fundamentally different from that of L1ers, this difference would still have many important theoretical L2 consequences, to which we turn.

2. Issues Raised by Shallow Processing

2.1 Two Essentially Different Manners of Processing Language Input

Shallow processing is not nearly as innocuous as it might seem at first blush; indeed, it has serious repercussions for models not only of L2 use but also of L2 acquisition. Consider the degree to which computations are sensitive to global context: i.e., informational encapsulation vs. informational promiscuity. If L2ers under-rely on syntactic information and over-rely on pragmatic and contextual information, then L2 processing is "promiscuous" in the sense of Fodor (1983). This suggests that for natives vs. L2ers, the entire relationship between language and other domains of cognition is fundamentally different. Furthermore, consider the consequences of shallow processing for the assumption of failure-driven grammar revision ("learning") in L2 acquisition. On this view, learning crucially depends on the recognition of a mismatch between the current state of syntactic knowledge, which is used in processing, and Target Language (TL) input being processed. If L2ers are shallow processors, it is difficult to see how they would come to recognize that a given state of syntactic knowledge is inadequate to parse TL input. Under such a story, many well-studied cases of developmental paths in L2 acquisition would be mysterious. Shallow Processing approaches at this point have not specified a principled limit on the syntactic detail of L2ers' processing, but, clearly, the more shallow their processing is imagined to be, the more difficult it is to account for Interlanguage syntax that has developed away from the grammatical state inherited from the L1.

2.2 Potential Problems

Needless to say, there are of course observable differences between native vs. nonnative processing; however, it does not follow that these differences necessarily point to fundamentally different processing mechanisms. Here we explore four potential sources of differences between native vs. L2 processing, none of which entails a difference in the fundamental nature of the processing systems. These four are: (1) non-target-like prosody; (2) "overlearned" vs. "underlearned" lexical access routines; (3) heteromorphy of semantic fields; and (4) the possibility that RT differences reflect different computational moments.

We first consider non-target-like prosody. Prosody significantly affects native processing outcomes (e.g. Fodor, 1998, 2002), and many (even advanced) L2ers have non-target-like prosodic systems. Dekydtspotter, Donaldson, Edmonds, Liljestrand and Petrush (submitted) through experimental control of prosody show that prosody affects even intermediate French L2ers' relative clause attachments. Thus, while applying principles of the Universal Parser to written TL sentences—as in the overwhelming majority of L2 processing studies—L2ers may impose non-target-like prosodies, yielding non-target-like outcomes. Of course, non-target-like outcomes in no way implicate parsing mechanisms fundamentally distinct from those of natives. L2 processing studies based on RTs of written stimuli, where there is no control for the prosody imposed by the respondents, invite the danger that observed differences between native and L2 processing may tell us little about the mechanisms underlying L2 processing.

Another potential source of differential outcomes in native vs. L2 processing involves lexical access. As discussed by Phillips (1996), natives develop "overlearned" routines for lexical access, as a function of experience and neural plasticity. We suggest that the situation for L2ers is very different. L2ers, by contrast, continue to struggle with ***underlearned*** lexical access routines, inhibiting processing efficiency. Indeed, Frenck-Mestre and Pynte (1997) and Frenck-Mestre (2002, 2005) present eye-movement evidence which suggests that even advanced L2ers continue to re-read stimuli. This means that L2ers are generally slower and less efficient processors than natives, but it is important to bear in mind that this, again, does not implicate distinct processing mechanisms from those deployed by natives.

There is yet another possible confound for L2 processing that relates to the L2 lexicon. Sprouse (in press) claims that the relexification process that Lefebvre (1998) defends for creole genesis generally characterizes L2ers' initial development. That is to say that the L2 lexicon is not built from scratch from TL input, but that L2 lexical items develop first through the re-labeling of L1 lexical items with perceived phonetic strings of TL input. It is only through error-driven reanalysis that these L2 lexical items come to approximate the similarly labeled items in the TL lexicon in terms of their precise morphosyntactic, semantico-pragmatic and other features. Consider, for example, the partial overlap of the French lexemes *pièce* vs. *salle* vs. *chambre* vs. *place* vs. *lieu*. Each of these French lexemes shares significant aspects of the semantic field of the English lexeme *room*, but in an important sense, each means both more and less than the English word *room*.

Imagine an English-French L2er who is at a stage of development where she has relabeled her English lexical entry 'room' as either *chambre* or *place*, and has not yet managed to posit two distinct entries in her French Interlanguage lexicon. Receiving sufficient exposure to relevant input is complicated by the richness and opacity of real-world contexts. While the L1er seems able to sort out fine pragmatico-semantic features, the L2er needs input that would signal that her ***current*** lexical item is inadequate. There is no guarantee that this process will lead to ultimate convergence on a target-isomorphic lexicon. A long-term result is heteromorphy of semantic fields associated with the "same" item. Consider now potential ramifications for L2 processing. On hearing an input sentence like *Il n'y a pas assez de chambres*, which the speaker intends to mean 'There are not sufficient separate sub-units of this building designed for human occupancy', the L2er may at least momentarily consider an interpretation along the lines 'There is not sufficient space' before recognizing that this interpretation is contextually implausible. Our claim here is not that the L2er will not arrive at the intended meaning, but simply that she may be distracted (and thus, further slowed) by irrelevant options that would never occur to a native processor. If the L2 perceiver should, however, fail to recognize that she has indeed misunderstood, she will then carry an unintended presupposition as she perceives the next part of the discourse. L2ers' processing may thus be diverted in ways atypical of natives' processing.

We turn now to the final of our four potential sources of difference between native and L2 processing. Compared with natives, L2ers process relatively slowly, perhaps with unhelpful prosodic contours, and with greater difficulty accessing a lexicon that is peppered with lexical items that include non-target-like (and potentially misleading) pragmatico-semantic features. Therefore, we suggest, native vs. L2 differences on comparisons of planned "target" segments may reflect different "moments" in the parsing process. This arguably compromises the validity of the presumed like-with-like native vs. nonnative comparisons. We develop this further in Section 3.

3. Delayed Effect of the Presence of Intermediate Traces in Marinis et al. (2005)

3.1 The Study

In this section we take a closer look at Marinis et al.'s (2005) study. Recall that Marinis et al. claim that L2ers' parses do not include intermediate traces in cross-clausal extractions. We will attempt to show that lurking in their data is evidence for precisely such intermediate traces in the parsing of at least some groups of L2ers. The study crossed phrase type—VP (5) vs. NP (6)—with movement (the a-sentences) vs. non-movement (the b-sentences).

(5) a. The nurse ***who*** / the doctor argued / **that** / the rude patient / had angered / is refusing to work late.
    b. The nurse thought / the doctor argued / **that** / the rude patient / had angered / the staff at the hospital.
(6) a. The nurse ***who*** / the doctor's argument / **about** / the rude patient / had angered/ is refusing to work late.
    b. The nurse thought /the doctor's argument/ **about** / the rude patient / had angered / the staff at the hospital.

Each respondent saw 5 sentences of each of these four types, for a total of 20 experimental sentences: 5 like (5a) and 5 like (5b), contrasting the presence of an intermediate trace; 5 like (6a) and 5 like (6b), which do not involve an intermediate trace but contrast with respect to movement. There were 34 Chinese-English L2ers, 26 Japanese-English L2ers, 24 German-English L2ers, and 30 Greek-English L2ers, as well as 24 native "controls." The mean age of the L2 groups was 24 to 26.5. The mean age of initial exposure to English was 8.67 to 11.94. L2ers scored above the "upper intermediate level" on the Oxford Placement Test and responded with 92.5% or higher accuracy to comprehension questions about sentences like those in (5) and (6), as reported in Table 1.

Learner Group	*n*	Oxford Placement Test	Questionnaire score
Chinese-English	34	156/200	92.50%
Japanese-English	26	169/200	92.31%
German-English	24	177/200	98.00%
Greek-English	30	173/200	96.17%

Table 1. L2ers' proficiency (from Marinis et al., 2005, p. 61, Table 1)

3.2 The Results

Marinis et al. planned two RT analyses: (1) at segment 3 '*that'* (seeking evidence of the intermediate trace) and (2) at segment 5 *'had angered'* (seeking evidence of the base trace). The results are summarized in Tables 1 and 2, followed by details of the statistical analyses.

Group	Conditions	Segment 3 (e.g. *that*)	Segment 4 (e.g. *the rude patient*)	Segment 5 (e.g. *had angered*)
Native English	movement	825 (310)	1268 (654)	1075 (567)
(*n* = 24)	– movement	729 (272)	1237 (764)	811 (268)
Chinese-English	movement	1062 (716)	2155 (1070)	1630 (826)
(*n* = 34)	– movement	836 (473)	1963 (880)	1349 (611)
Japanese-English	movement	956 (694)	2053 (832)	1560 (529)
(*n* = 26)	– movement	955 (506)	1674 (505)	1420 (446)
German-English	movement	977 (353)	1628 (563)	1609 (888)
(*n* = 24)	– movement	925 (309)	1196 (449)	959 (229)
Greek-English	movement	838 (485)	1757 (1354)	1330 (902)
(*n* = 30)	– movement	875 (417)	1634 (1103)	1086 (606)

Table 2. Mean reading times (and standard deviations) on critical segments 3, 4 and 5: VP context (from Marinis et al., 2005, p. 65, Table 2)

Group	Conditions	Segment 3 (e.g. *that*)	Segment 4 (e.g. *the rude patient*)	Segment 5 (e.g. *had angered*)
Native English	movement	833 (340)	1368 (619)	1307 (750)
(*N* = 24)	– movement	657 (193)	1066 (525)	820 (249)
Chinese-English	movement	814 (589)	2492 (1290)	1813 (925)
(*N*= 34)	– movement	857 (365)	1676 (744)	1503 (826)
Japanese-English	movement	1126 (587)	1972 (861)	1910 (765)
(*N* = 26)	– movement	918 (279)	1643 (513)	1523 (689)
German-English	movement	935 (290)	1351 (506)	1374 (537)
(*N* = 24)	– movement	753 (220)	1265 (470)	925 (339)
Greek-English	movement	837 (365)	2022 (1547)	1394 (1036)
(*N* = 30)	– movement	664 (254)	1417 (764)	1008 (475)

Table 3. Mean reading times (and standard deviations) on critical segments 3, 4 and 5: NP context (from Marinis et al., 2005, p. 65, Table 2)

- A three-way ANOVA revealed a main effect of extraction ($F(1, 129) = 8.412$, $p < .01$) and of language ($F(1, 129) = 2.443$, $p < .05$), and a main effect of phrase type approached significance ($F(1, 129) = 3.081$, $p = .085$).

- Natives: An ANOVA (extraction x phrase type) revealed a main effect of extraction on segment 3 ($F(1, 23) = 4.578$, $p < .05$) and on segment 5 ($F(1, 23) = 11.045$, $p < .01$). On segment 5, there were both a main effect of phrase type ($F(1, 23) = 4.759$, $p < .05$) and an interaction effect between phrase type and extraction ($F(1, 23) = 4.994$, $p < .05$). Pairwise *t*-tests calculated for segment 5 in the VP context also revealed a contrast between RTs for movement vs. non-movement ($t(23) = 2.560$, $p < .05$).

- L2ers: A main effect of extraction on segment 3 was not found in the RTs of Chinese, Japanese and Greek L2ers, although it was observed in the subject analysis of German L2ers ($F(1, 21) = 4.388$, $p < .05$). On segment 5, a main effect of extraction was found for all L2 groups: Chinese ($F(1, 31) = 6.784$, $p < .05$); Japanese ($F(1, 25) = 8.162$, $p < .01$); German ($F(1, 21) = 15.175$, $p < .01$); Greek ($F(1, 29) = 9.149$, $p < .01$). Also on segment 5, a main effect of phrase type was found for the Japanese L2ers, ($F(1, 25) = 5.031$, $p < .05$), and an effect of phrase type also appeared in the item analysis of the German L2ers.

For Marinis et al., the main point is that the natives look different from the L2 groups. While there is straightforward evidence for traces on both segment 3 and segment 5 for the natives, this is not generally the case for the L2ers. While a main effect of extraction was found on segment 5 for all L2 groups, a main effect of extraction was not found in the RTs of Chinese, Japanese and Greek L2ers on segment 3, although it was observed in the subject analysis of German L2ers.

3.3 Problems

So, on the basis of the non-isomorphy of contrasts between natives vs. L2ers on the planned segments, Marinis et al. (2005, p. 68) argue that "learners integrated the filler with its subcategorizer at segment 5 in both extraction conditions but that filler integration was not facilitated by the availability of an intermediate syntactic gap in the extraction-VP condition." However, we note that RTs for segment 4 are longer for movement than for non-movement, suggesting a delayed effect. An ANOVA run by Marinis et al. found a main effect of language. Therefore, for each language group, we calculated two one-tailed dependent samples *t*-tests on segment 4 for the VP and NP contexts on the basis of the results reported in Tables 2 and 3, assuming a Bonferroni protection measure of $\alpha = .05/2 = .025$. The results are given in Table 4.

Group	Context	Statistics (movement vs. non-movement)
Native English	VP context	$t(23) = .151$, $p = .441$
	NP context	$t(23) = 1.82$, $p = .041$
Chinese-English	VP context	$t(33) = .808$, $p = .212$
	NP context	$t(33) = 3.20$, $p = .002$
Japanese-English	VP context	$t(25) = 1.986$, $p = .029$
	NP context	$t(25) = 1.674$, $p = .053$
German-English	VP context	$t(23) = 2.939$, $p = .004$
	NP context	$t(23) = .610$, $p = .274$
Greek-English	VP context	$t(29) = .386$, $p = .351$
	NP context	$t(29) = 1.92$, $p = .032$

Table 4. Dependent samples comparisons of mean RTs between movement and non-movement conditions for segment 4 in VP context and NP context

In the VP context, "spill-over" asymmetries at segment 4 arise for the German-English group and the Japanese-English group, and crucially, this occurs ***only*** in the VP context—but not in the NP context—indicating the presence of an intermediate trace, albeit not on the "targeted" segment. The procedures adopted by Marinis et al. (2005) hence make it possible to miss the presence of an intermediate trace, if there is delay. Again crucially, whether an effect of intermediate trace was measured on this task is ***not*** correlated with language type. Both German and Greek exhibit *wh*-movement; but of these two languages, the task registered an effect of an intermediate trace only in German-English Interlanguage. Similarly, relative clauses in Chinese and Japanese are standardly analyzed as not being derived by *wh*-movement; but of these two, there is evidence for intermediate traces only in Japanese-English Interlanguage. We conclude that the results of Marinis et al. (2005) in fact do not support the Shallow Structure Hypothesis, given the fact that there is evidence that (some groups of) L2ers do indeed compute intermediate traces—even if with some delay.

It will not suffice for Shallow Structure Hypothesis proponents to interject here that not all L2ers (or L2 groups) exhibit the relevant asymmetry and to propose a weakened version of Shallow Processing, supported by the Greek and Chinese L2ers, who did not exhibit evidence of having posited intermediate traces. Recall that it is the ***presence*** of an asymmetry specifically in the VP context alone that requires an explanation. In contrast, the ***absence*** of statistical asymmetries (i.e. the finding of null results) in Chinese-English and Greek-English provides no valid argument for Shallow Processing (or any other hypothesis).

4. Conclusion

If true, the Shallow Structure Hypothesis would have significant repercussions not only for L2 use but also for L2 syntactic development. Because the advocates of the Shallow Structure Hypothesis have not yet made explicit precisely how shallow they claim L2 processing to be, it is not obvious what kind of L2 data, apart from L2 data that fully mirror mature L1 data, could count as clear counterevidence against their hypothesis. However, evidence that L2ers' processing ***does*** posit intermediate traces seems to meet the Shallow Processing Hypothesizers' own implicit threshold. And finally, as we discussed in Section 2.2, there are, moreover, a number of reasons why (developing) L2 processing outcomes might differ from (mature) native processing outcomes, even if one and the same processing algorithm underlies them both. Hence, the mere observation of difference does not imply fundamental difference.

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Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006): The Banff Conference

edited by Mary Grantham O'Brien, Christine Shea, and John Archibald

Cascadilla Proceedings Project Somerville, MA 2006

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ISBN 1-57473-416-4 library binding

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Dekydtspotter, Laurent, Bonnie D. Schwartz, and Rex A. Sprouse. 2006. The Comparative Fallacy in L2 Processing Research. In *Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006)*, ed. Mary Grantham O'Brien, Christine Shea, and John Archibald, 33-40. Somerville, MA: Cascadilla Proceedings Project.

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Dekydtspotter, Laurent, Bonnie D. Schwartz, and Rex A. Sprouse. 2006. The Comparative Fallacy in L2 Processing Research. In *Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006)*, ed. Mary Grantham O'Brien, Christine Shea, and John Archibald, 33-40. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #1485.