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To correct or to cooperate:

Mediational processes and L2 development

I Introduction

Pit Corder's (1967/1981) seminal paper on error correction, frequently regarded as among the very first publications in applied linguistics, drew researcher attention to what has remained a topic of ongoing discussion among language teaching scholars and practitioners: how to most appropriately respond to learner errors and what impact, if any, responses to errors have on learner L2 development. Much research into this topic is associated with the term *corrective feedback*, which Lightbown and Spada (1999, p. 171) defined as "any indication to the learners that their use of the target language is incorrect." It is hardly surprising then that understanding possible approaches to corrective feedback and how they might shape learner progress in studying the target language holds some urgency for L2 researchers and teachers alike (Ellis, 2017).

Since the appearance of Aljaafreh and Lantolf's (1994) study of error corrections and tutor-learner interactions around L2 writing, researchers have also looked to Vygotsky's (1987) Sociocultural Theory (SCT), especially the concept of *mediation*, as a way to conceptualize how teacher engagement with learners can guide learner L2 development. In Aljaafreh and Lantolf's study, mediation was understood as a range of tutor behaviors intended to signal to learners that an error had been produced and to guide learners toward identification and correction of the error. A major contribution of that study was that it did not rely upon a single strategy but rather proceeded in a systematic manner such that tutor support was as minimal as necessary for learners to self-correct proposing a 'regulatory scale' of tutor, often referred to as mediator, behaviors arranged from implicit to explicit. On the implicit end of the scale, the presence of the tutor helped to construct an interactive frame in which learners attempted to revise their work. If learners were unable to make corrections independently, the tutor began to offer support, including prompts to reread portions of text, clues concerning the nature of errors, and ultimately revealing correct responses and offering metalinguistic explanations. As Ellis (2017, p. 12) observed, the SCT concept of mediation orients discussions of corrective feedback away from determining the most appropriate *strategy* that teachers might use with learners and emphasizes instead a *process* in which teachers and learners "work through" a range of strategies together "with a view to using the most implicit strategy that helps a learner to self-correct an error."

In the years since Aljaafreh and Lantolf's (1994) paper, L2 SCT researchers, particularly those working within the framework of Dynamic Assessment (DA), have continued to design pedagogical interventions according to a process of implicit-to-explicit mediating moves, documenting the implementation of various forms of mediation with learners, analyzing the dynamics of learner engagement and responsiveness during such interactions, and elaborating how this kind of cooperation may reveal and promote learner abilities (Davin, Herazo, & Sagre,

2016; Levi, 2017; Poehner, 2009). Following Haywood and Lidz (2007), the quality of cooperation between teachers or tutors (i.e., mediators) and learners during DA is particularly important because a stated objective of DA procedures is to identify learner abilities in the process of maturing. According to Vygotsky's (1978) discussions of the Zone of Proximal Development (ZPD), learner independent performance is indicative of their *actual* abilities, understood as the range of psychological functions that have developed up to the present, as individuals have internalized available forms of mediation and are able to use them to regulate their thinking and actions. Observations of independent performance, for Vygotsky, thus capture only a part of learner abilities. A fuller view becomes available when one takes into account learner functioning with external forms of mediation. Vygotsky (1987) discusses models, diagrams, symbolic systems such as language and numbers, as well as dialogic interaction as invaluable forms of mediation that comprise social environments and that individuals can engage with to stretch beyond their actual abilities. In DA, greater involvement required from a mediator signals that a learner is further from self-regulated functioning; conversely, learners requiring relatively minimal guidance from a mediator are closer to successful independent performance. Moreover, as Luria (1961) reported, examination of the quality of mediator-learner interaction, including moves made by mediators and the ways in which learners respond, can reveal reasons behind learner poor performance and provides important information for subsequent instruction. The "great practical significance" of the ZPD, as Vygotsky (1998, p. 204) put it, is in providing a way of thinking about performance that understands it as mediated and as continuing to shift dynamically as learners develop but also as they encounter new challenges. Following Vygotsky, we partly concur with Ellis's (2017) characterization of mediation, mentioned earlier. Specifically, Ellis is correct that mediation in the SCT tradition is best understood as a process undertaken with learners rather than the selection and application of any individual form of corrective feedback. However, it is not entirely accurate that the goal of this process is to identify the most implicit feedback required for learners to self-correct. Rather, the aim is to reveal learners' relevant knowledge and understanding; to help learners as they reflect on, revise, or extend that knowledge; and to guide them toward employing their knowledge to make decisions about their language use. Correction of a given error may indeed occur, but the focus in SCT is learner development beyond the immediate task at hand. Indeed, engagement in a mediation process may not result in learner self-correction, and this is equally important for understanding learner knowledge and abilities.

The present paper is not concerned with arguing whether mediation as an interactional process is more efficient than a particular corrective feedback strategy in leading learners to revise their errors. Our interest is in examining and documenting how a mediational process may be helpful to identifying learner difficulties and tracing their developmental trajectories. We suggest that this interest is one that cuts across mediation research in the SCT tradition and corrective feedback scholarship in SLA more generally. Both ultimately endeavor to help learners improve their control over the target language. The emphasis on a range of mediator moves as well as negotiation with learners and tracking changes over time, on both the scale of a single activity and across activities, are dimensions of mediation in SCT that may open up possibilities for L2 researchers, including those working in a corrective feedback framework, as they consider the range of interactional resources that may be called into service to understand learner abilities and guide their development.

Given this aim, we report findings from two recent studies of DA conducted with secondary school learners of L2 English in Estonia. The first is a small-scale case study concerned with processes of mediator-learner cooperation during one-to-one DA interactions. The second study, which integrated a standardized range of mediation options for a computerized DA (C-DA) procedure, reports sets of learner scores from piloting of the tests. Qualitative analysis of interaction from the first study provides a nuanced view of learner abilities that would be difficult to achieve either through observation of independent performance or through the application of a single feedback strategy. The learners' performance in the second study, which included their independent completion of tasks prior to and following the C-DA, was analyzed mostly quantitatively with the aim of tracking learners' developmental trajectories and how, if at all, they may have benefited from mediation. Results are discussed in relation to the SCT premise that DA yields an empirical prediction of a potential future according to learner engagement in cooperation in the present.

II Mediation: From strategy to interactional process

SLA researchers generally accept that error correction can be important for learner L2 development, particularly in instructed contexts. Doughty and Williams (1998) express this view succinctly in contrasting L1 and L2 developmental processes. They point out that while the former occurs largely outside of formal instructional settings during early childhood as general cognitive abilities are also developing, the same is not true in many cases of L2 acquisition. They recommend against "leaving learners to their own devices" and instead advocate the value of explicit instruction, including corrective feedback (p. 197). This sentiment has been echoed more recently by Nassaji and Kartchava (2017), who conclude:

> considerable research suggests that L2 learners, particularly adults, can not develop native-like accuracy based on mere exposure to models of grammatical input and that they need corrective feedback in order to acquire an L2 successfully (p. xi).

A widely used convention in corrective feedback research has been to place strategies along a continuum of implicit to explicit. Behaviors resembling those found in everyday, non-instructional interactions (e.g., a pause or a confused facial expression) are frequently regarded as implicit while toward the explicit end of the continuum are strategies that are increasingly instructional in character, such as telling the learner that s/he has made an error and providing the necessary correction (Ellis, Loewen, & Erlam, 2006; Long, Inagaki, & Ortega, 1998). Such typologies have been useful as SLA researchers have sought to determine the efficacy of particular strategies in raising learner awareness of errors and helping correct them.

Review of that extensive body of research is beyond the scope of this paper. Moreover, as explained, our interest is not to compare a particular corrective feedback strategy to the SCT notion of mediation but rather to continue the discussion of how the latter approach, as a theoretically motivated process, may support the shared goal of understanding and promoting learner abilities. An early study investigating the effectiveness of a range of corrective feedback strategies brought together as an interactional mediating process is reported by Nassaji and Swain (2000). Those authors conducted a small-scale investigation analyzing learner independent control of English articles following one of two forms of instructional interaction,

one in which feedback strategies were applied at random and the other in which strategies were arranged from implicit to explicit and delivered one after the other, becoming more explicit until an appropriate response was elicited from the learner. In this way, Nassaji and Swain sought to compare the experiences of these two approaches. The latter was organized specifically according to the mediating moves described by Aljaafreh and Lantolf (1994). While the project involved only one learner in each condition, the authors reported that the process of negotiating feedback according to learner responsiveness, that is, the mediation condition, was particularly effective. In fact, the learner for whom mediation was negotiated through an interactional process actually performed worse on the initial assessment of her independent performance but evidenced progress throughout the tutoring sessions and outperformed the randomized condition learner on the final assessment.

A more recent study by Erlam, Ellis, and Batstone (2013) disputed whether the process of interactive mediation leads learners to greater success than overt correction. Those authors conducted a partial replication of Aljaafreh and Lantolf's (1994) study, comparing the effects of Aljaafreh and Lantolf's graduated process mediation with one in which all learners received only explicit identification that they had produced an error, the necessary form, and a metalinguistic explanation of the rule or pattern invoked. A major point of contention brought out in Erlam et al.'s analysis is that learners in the graduated form of mediation condition did not evidence a steady reduction in the number of mediating prompts they required over either the course of a given session or across sessions, which was different from Aljaafreh and Lantolf's finding. This led Erlam et al. to question the efficacy of this approach over other corrective feedback strategies.

Interestingly, in a response to Erlam et al., Lantolf, Kisselev, and Kurtz (2016) re-examined the entire data set from which Aljaafreh and Lantolf's (1994) study had drawn. Lantolf et al. found that while there was an overall trend toward less reliance on a mediator over the course of their intervention program, analysis of individual sessions revealed that this was far from a linear process. They explain that examining learner trajectories from session to session revealed that an individual might require less support in one session only to struggle more in the next before showing substantial improvement in yet a third session. According to Lantolf et al. (2016), such a trajectory is in line with Vygotsky's (1987) position that development is not a smooth transition from one stage to the next but rather a revolutionary process.

Before moving on, we wish to emphasize that mediation holds a different ontological status in Vygotskian theory than does corrective feedback in SLA. Rather than a form of input or an instructional practice, mediation was identified by Vygotsky (1978) as the essential driver of the uniquely human forms of consciousness. Indeed, Vygotsky (1998, p. 168, italics in original) describes the "first law of the development and structure of higher mental functions" as a "*transition from direct, innate, natural forms and methods of behavior to mediated, artificial mental functions that develop in the course of cultural development.*" Unfortunately, Vygotsky did not elaborate how mediation might be construed for pedagogical interactions aside from references to hints, prompts, leading questions, and models (Vygotsky, 1987). As explained, Aljaafreh and Lantolf's (1994) study proved highly influential through its documentation of organizing mediating moves from explicit to implicit. This principle has been adopted in most L2 DA research (e.g., Poehner, 2008b; Poehner, Zhang, & Lu, 2015). In addition, two other principles, both derived from the work of Israeli psychologist Reuven Feuerstein (e.g.,

Feuerstein, Feuerstein, & Falik, 2010), have guided much L2 DA research and informed the projects we describe in this paper. They are *learner reciprocity* and *transcendence*.

Briefly, reciprocity emerges from an understanding that DA interactions open up a number of possibilities for learner response and contribution. Lidz (1991, p. 110) first proposed the term *reciprocity* in order to capture the quality of learner "receptivity to the mediational intentions" of a teacher or expert. Rather than a binary notation that a learner evidenced improved performance following a mediating move from a teacher, Lidz proposed that a more helpful question for understanding learner abilities is, "[h]ow able or willing to receive [support] or to cooperate" are learners during DA interactions? In this way, reciprocity both aligns with and complements Aljaafreh and Lantolf's (1994) conclusion that one approach to examining learner development is to trace changes in the amount of external support they require, even if they do not become fully independent. Reciprocity compels us to include in our analysis forms of learner engagement with mediators. Poehner's (2008a) DA study involving U.S. university undergraduate learners of L2 French offers an in-depth discussion of learner reciprocity. Examining one-to-one DA interactions between a mediator and learners carrying out oral narration tasks in the target language, Poehner identified a variety of learner moves during DA: unresponsiveness, simply repeating the mediator's remarks, requesting additional support, verbalizing explanations of their thinking, and even rejecting mediator assistance. Extending this work to listening comprehension tasks, Ableeva (2010) maintained that rather than proposing that particular reciprocating behaviors necessarily indicate that a learner is near or far from independent functioning it is more appropriate to interpret them in the context of mediator-learner interaction, and specifically in relation to the mediating moves that prompted the behavior.

Transcendence, as discussed by Feuerstein (e.g., Feuerstein, Feuerstein, & Falik, 2010), concerns recontextualizing one's knowledge and abilities as new situations, problems, and tasks are encountered. Feuerstein identifies transcendence as an essential feature of mediation and what distinguishes it from task-specific skill-building. Again, Feuerstein's views resonate perfectly with those of Vygotsky, who argued forcefully that education promotes new ways of thinking and acting as mediational means are internalized and become resources for self-regulation. One way in which transcendence is pursued in DA research is through the intentional sequencing of tasks such that learners are required to approach increasingly complex problems or to apply principles and concepts in new combinations to resolve difficulties. Transcendence is also integrated in DA interactions as mediators and learners actively connect insights, difficulties, and potential solutions to previous situations and to related phenomena within a particular area of study, such as language.

Taken together, reciprocity and transcendence emphasize mediation in a manner aligned with Vygotsky's (1978) vision of cooperation with learners, in which their achievements during joint activity foreshadow their potential independent functioning in the future. It is this idea of cooperation undertaken *with learners* rather than corrections applied *to their performances* that undergirds DA, especially as it has been introduced to the L2 field (Poehner, 2008b; Poehner & Lantolf, 2005). A number of studies are now available reporting applications of DA with L2 learners. Full review of that research is beyond the scope of the present paper, and we refer interested readers to Poehner (to appear). What is most relevant to our present discussion of mediation and corrective feedback is that, in our view, DA has the potential to shift how

assessment is conceived in relation to L2 education more generally and that this shift has implications for how learner errors are understood and how feedback is construed.

To date, L2 DA researchers have generally favored small-scale projects undertaken with teachers working in instructional contexts and concerned with understanding and responding to sources of difficulty experienced by individual learners as they struggle to control particular features of the target language (e.g., Da Silva Iddings, 2014; Davin & Herazo, 2015; Poehner, 2008b, 2009). This has led some to note similarities between DA and certain types of formative assessment (e.g., Leung, 2007; although see Poehner & Lantolf, 2005, for points of contrast between these concepts). Recent work has begun to implement DA on a larger scale, in contexts typically associated with more formal approaches to testing (e.g., Levi, 2017; Poehner, Zhang, & Lu, 2015). To be sure, much more work is needed to better understand the ways in which DA principles may lead to practices and procedures that can be implemented with various populations of learners, studying at different levels of proficiency, and in their particular educational contexts. Nonetheless, it is our view that the variety of situations in which L2 DA has already been undertaken points to its value not as an assessment *technique* but rather as a theoretically principled *framework* for thinking about assessment – in all its forms – in relation to teaching. The two studies we report in this paper were pursued partly to investigate how mediation as a cooperative process might inform both small-scale, interactive forms of assessment as occur in classroom settings as well as more formal, large-scale approaches to testing. That is, the studies are both part of a broader effort to elaborate a multi-pronged approach that unites informal, classroom-based assessment and formal testing through shared principles of mediation, wherein instruction – including interaction around errors and difficulties – forms an integral feature of how learner L2 abilities are interpreted and supported. This broader concern with L2 assessment culture would appear to be an area of potential shared interest for L2 scholars working within SCT and those interested in corrective feedback, and indeed it would allow for the exploration of corrective feedback practices in the service not only of instruction but also as part of the process of diagnosing learner abilities. We return to this point in the Discussion.

III The Studies

The data that we report come from two separate projects, full details of which have been described elsewhere (Leontjev, 2016). We focus our attention here on the co-constructed nature of the mediational process, the insights it affords into learner abilities, and how it may support learner development. For the sake of clarity, we present the background of the studies and their results separately.

The data coming from the first study pertain to how mediation as a process allows for an understanding of learner L2 abilities that is beyond the more dichotomous (i.e., correct or incorrect) observation of learner responsiveness when a single corrective feedback strategy is applied. The second project examines the use of a C-DA procedure to chart learners' developmental trajectories. The Discussion will bring these findings together as we return to our broader concern with how a mediational process can allow us to create educational environments that move learners toward increasingly autonomous use of the target language.

We note at the outset that both studies build upon and extend the existing body of L2 DA research. As mentioned, perhaps the most substantial contribution these studies make is that they were conceived to investigate uses of DA in a small-scale interactional context that might be integrated into classroom practice as well as more traditional testing. In addition, the first of the two studies we report follows in the tradition of reporting close interactional analysis of mediator-learner engagement in DA (see, for example, Da Silva Iddings, 2014; Davin & Herazo, 2015; Poehner, 2008b) and contributes to this work by implementing similar mediational procedures in a new cultural context and focused on a different feature of language than in those studies. The present study also adds a longitudinal component that has not been included in previous research, as the mediator engaged in a follow-up session with the learner approximately a year-and-a-half following the original DA sessions. While this feature of the study is not the primary focus of our discussion in this paper, which remains concerned with the mediation process itself, the importance of this follow-up is that it allows for investigation of the durability of changes in learner understanding of relevant language features that emerged during DA. Details of this aspect of the project are reported by Leontjev (2016).

The second study relied upon a computer program rather than a human interlocutor to make mediation available during an assessment procedure with L2 learners. As Lantolf and Poehner (2013) note, very few studies of C-DA exist within or outside the L2 field. To our knowledge, the most in-depth C-DA project with L2 learners prior to the present study is reported by Poehner, Zhang, and Lu (2015). The present study differed significantly from that project. One difference is that the earlier study targeted the more global constructs of L2 listening and reading comprehension whereas the present study maintains a tighter focus on English morpho-syntax. Another important difference is that in Poehner, Zhang, and Lu's (2015) approach, a multiple-choice format was employed and learners were permitted to attempt each item four times, receiving a mediating prompt after each unsuccessful attempt. As those authors acknowledge, fewer response choices were available with each attempt, and therefore the likelihood of guessing was increased. As will be explained, a different approach to C-DA was developed for the present study that addresses this issue by employing multiple items for each construct but permitting learners only a single attempt per item. Finally, the present study departed from Poehner, Zhang and Lu's approach by including traditional (i.e. non-DA) pre- and post-test measures of learner ability as a way of capturing learner change over time.

1 One-to-One DA of English Derivational Affixes

The first study was a small-scale piloting of an interactive DA procedure that was undertaken as the researchers gained the opportunity to follow the development of a learner in a secondary school in Estonia over the course of a year and a half. Given that the intent was to qualitatively examine how mediation guided learner development over time, a case study approach was adopted. One learner (henceforth, L) was recruited. L was a 16 year-old male L1 Russian learner of English who, at the outset of the study, had been studying English for approximately 7 years.

The data set comprised transcriptions of three weekly sessions during which L was (1) asked to independently complete several exercises on paper designed to elicit his knowledge and use of L2 English derivational affixes and (2) engaged in an interactive DA review of the tasks with a mediator (M) that focused on items L had either answered incorrectly or had skipped. Specific tasks employed for the DA included classification (e.g., *which of the following words*

are nouns? What parts of speech are the rest of the words?) and affix elicitation (filling in a gap in a sentence by forming a derived word for the provided base word) exercises. It is worth noting that we use the term task here as interchangeable with 'exercise' and not in the way that *task* is defined in task-based pedagogies. 'Baseline' indicators of L's independent functioning were collected one week prior to the first DA session and one week following the final DA. For these baseline assessments, L independently completed a battery of seven online exercises focused on affixes, being directed to think aloud during his performance. This was recorded, and immediately following his completion of the tasks, he reviewed the video of his performance with the mediator, reflecting on his linguistic choices and commenting upon his reasoning, the latter also recorded and transcribed. In this way, comparison of L's independent performance and verbalized reflections prior to DA and following it allowed the possibility to determine ways in which the mediational process may have contributed to changes in L's knowledge of English affixes and ability to appropriately control them. L's performance on these independent indicators is considered in detail in Leontjev (2016).

In what follows, we present two excerpts from L's interactions with M as they jointly work through items requiring the use of the suffix *-th* to form nouns. Excerpt 1 is taken from the first DA session, and Excerpt 2 from the second DA session approximately one week later. These particular excerpts were selected to illustrate the interplay between M's use of a variety of what might be considered corrective feedback strategies and L's reciprocating behaviors, forming a mediation process which both affords insights into L's knowledge and creates opportunities for that knowledge to be extended. The second reason for the selection is because they both address the same language feature, so the differences in the quality of the mediation process suggest that L's knowledge has changed, as will be discussed.

Note that the interactions originally occurred primarily in Russian, but for the sake of space, they have been rendered in English here. Parts of the interaction that were originally spoken in English have been indicated in the transcript with bold font. Full transcription conventions are provided in Appendix A.

In Excerpt (1), M and L have turned to an item L had skipped while independently completing the task. The item, *The _____ (wide) of this river is amazing*, required L to add the suffix *-th* to the noun *wide* in order to form the needed *width*. In line 1, M has already offered L the opportunity to self-correct, but L remained unresponsive and so M reads the item aloud, verbally reinforcing the parameters of the task, namely to form a word from the base *wide*.

Excerpt (1)

1.	M:	↑**The**: uhu (.) **something formed out of wide** (.) **of this river is amazing** (0.8)
2.	L:	I think it is by analogy with the word **length**
3.	M:	Ri:ght

In response to M's verbalization of the task's parameters in line 1, L's reciprocating move (turn 2) is to externalize his thinking. This allows M to ascertain two important insights. First, L is thinking analogically, implying that he understands that morphology marking in English follows patterns. Put another way, L is not likely to simply guess, which suggests that if the patterns can be determined, he may be able to form the needed words even if he has not yet learned them as discrete lexical items. Second, L has some sense of the meaning of the word *wide*, attempting to connect this with a word he knows, *length.* With regard to corrective feedback, it is possible that L might have verbalized this knowledge in response to a metalinguistic prompt, a recast, or some other move. However, the learner has not been led to share this knowledge. M's contribution to this point has simply been to remind him of the task's demands. Worth noting is that, perhaps owing to the dialogic framing of DA, M only accepts L's response in the next turn as L pursues his proposed analogical reasoning.

4.	L:	It will be (.) well, I don't know. (6.8) If to choose **wide-weight** it will be weight (.) **weight**
5.	M:	Right. **Wide-weight** they sound completely different [[these words]]
6.	L:	[[Yes]]
7.	M:	That is you know this is by analogy with the word **length**?
8.	L:	(0.4) Well, I assume
9.	M:	Right. You almost ↑guessed. That is you guessed COMPLETELY correctly, because (4.5) this suffix (2.8) is very often used in measurements

In turn 4, L relates *wide* to *weight*, which is faulty, although one can appreciate the mistake since there is a clear orthographic connection (-*ht* and -*th*). As a form of reciprocity, L's response indicates that he has at least an implicit awareness that the base of a word may change when affixes are attached. Knowing this allows M to provide a metalinguistic explanation of the function and the denotation of the suffix (turn 9). As the interaction continues, M emphasizes the suffix -*th* in *length* but also models the process of forming the required nominative from the base word, contextualizing it in an example sentence (turn 15).

11.	M:	**LengTH**. Which suffix do we have at the end? (0.9) **Length**?
12.	L:	/**dʒɪ eɪtʃ**/ (1.9) ((some turns omitted))
13.	M:	**LengTH**?

14.	L:	Length (5.3)
15.	M:	So: (0.5) what (.) what is the suffix? (1.2) **She's got long hair. The ↑lengTH of her hair is more than one meter. (3.4) Long (.) hair - length** ((some turns omitted))
16.	L:	(1.0) **/θ/**

M's focus appears to shift somewhat at this point as he begins to work with L to extend his current knowledge of English affixes, guiding him toward the required form. As L continues to struggle with changing the base *wide,* M proposes attempting to formulate the word in writing:

17.	M:	Try to (.) write this word
18.	L:	And then we can speak it out
19.	M:	(0.3) And then (.) and then we can try to pronounce it
20.	L:	(21.6) ((writes **wideth**)) I don't know how it is written
21.	M:	Almost right. that is you guessed that this word is (.) by analogy with **length**, (0.5) we decided that this suffix is /**ti eɪtʃ**/, (0.8) the only thing that (.) we don't need /**i:**/ (0.6) **width**
22.	L:	Ah.
23.	M:	(2.4) This suffix (.) is not used very often in nouns, but it is used, and as a rule, in measurements. right. And the base changes a bit, like ↑**long** (0.6) **length** (0.8) formed out of adjectives (1.4) the same **wide** (.) **width** here it is changed just a little **/i:/** is removed. (3.2) right. (1.4) well ↑great (.) let's move over to the last sentence

While it could be the case that M has switched focus to guiding L toward the form required for the task at hand, it is equally possible that M's effort is intended to model strategies, such as considering the needed elements, determining whether the base word changes, and using writing as in order to support contemplation of the forms as well as the process. With regard to the latter strategy, it is worth noting L's reciprocating move in turn 18 as he works with M to formulate the approach together. The mediating process culminates with L writing and M speaking the word aloud, noting the vowel change.

M concludes the mediation process by reviewing what they have learned (turn 23). This move is directly relevant to the notion of transcendence, as discussed earlier, because it prepares

L to connect the present interaction with possible future situations in which he will encounter similar language forms. In this regard, M's 'review' represents yet another shift in the mediational process, helping L to transcend the task at hand by reminding him of the important information and processes that he can carry forward to future tasks. The interaction in Excerpt (1) then reveals a number of distinct moves on the part of M, including reminders of task parameters, articulating various considerations when forming new words through the addition of a suffix, and noting connections with similar or related words in English. Each of these moves was carried out in relation to learner reciprocating acts, and over the course of the interaction, M and L's contributions shifted in focus from diagnosis to modeling and instruction and finally to reviewing what has been learned.

Approximately one week later, during the second DA session, M and L once again consider an item requiring addition of the suffix *-th* and that L had skipped while independently completing the task. The item, *The* _____ *(broad) of her knowledge includes art* also requires a change to the base word as 'broad' becomes 'breadth.' It also offers an opportunity for M to understand whether L is able to bring to this task the knowledge and processes from their previous session. In comparison with Excerpt 1, clear differences are apparent both with regard to the extent of mediator contribution and L's reciprocity. We enter the exchange as M attempts to orient L to considering the part of speech provided (*broad*, a modifier) and the one required (*breadth*, a substantive).

Excerpt (2)

1.	M:	That is the word (.) in the brackets (.) that we have (.) is which [part of speech]?
2.	L:	[Adjective]
3.	M:	And which one do we need?
4.	L:	A noun ((some turns omitted))

In turns 2 and 4, L responds correctly to both queries, indicating that he indeed understands the parameters of the task and possesses metalinguistic knowledge for identifying parts of speech. However, this in itself appears insufficient to guide L to the required form, *breadth*. In turn 5, M shifts to inquiring whether L can determine the likely meaning of the sentence and what that signals for the meaning of the required word. It is worth pointing out that while the form *broad/breadth* concerns a measurement just as *wide/width* did in Excerpt 1, the meaning of the sentence here may be less apparent to L2 learners as it is a metaphorical measurement. Nonetheless, as the exchange continues, we see from L's response in turn 6, in which he renders the sentence appropriately in his L1 (Russian), that he has correctly interpreted it:

5.	M:	Let's look at the meaning of this sentence and what (.) this word can mean

6.	L:	(5.2) The breadth of his knowledge includes arts?
7.	M:	Right, good. Breadth. (1.3) And what is 'breadth'?
8.	L:	A measure
9.	M:	Right

Up to this point, M's contributions have only probed L's knowledge rather than offering explicit guidance. That is, the mediation process has revealed L's metalinguistic awareness of what is required as well as his appropriate comprehension of the sentence, and while this may offer a model of how L can think through morphological transformations more generally, M has not overtly endeavored to guide L to the necessary form. That shift from probing to guiding, similar to what occurred in Excerpt 1, begins in turn 10:

10.	M:	This suffix means (1.5) a kind of a quality, which often is used (.) more often in measurements
11.	L:	(22.8) /**ti: eɪtʃ**/?
12.	M:	(2.3) Right (0.4) GOOD (1.2) the base changes you know
13.	L:	Yes (2.5)
14.	M:	Try to guess
15.	L:	(5.2) /**brɑɪθ**/? ((some turns omitted))
16.	M:	**He is strong. his strength**.
17.	L:	(1.4) **Bread**? (0.4) **breadth**? well, how do I say?
18.	M:	**↑BREADTH**

Alerting L that the required suffix relates to measurement leads, after an extended pause, to L's correct identification of *-th*. As a form of mediation, the pause in turn 11 positions L to assume maximal responsibility for his performance, and he produces an appropriate response. Nonetheless, both the time elapsed before L's response and his questioning intonation suggest

L's uncertain, indicating he does not yet have full control over the form. Recall that in Excerpt 1, M actively led L to the suffix, offering the word *length* and asking L what suffix he heard and then explaining how *-th* is used in English. In Excerpt 2, L has carried this knowledge forward, even if he does not yet use it independently. For example, in addition to his hesitation in producing the suffix in turn 11, he also does not automatically add it to the base word *broad*. He does this only when prompted and reminded that the base will change.

Notably, a year-and-a-half later, during a follow-up interview, M and L's discussion turns to an item in which L was asked to form different parts of speech from the word *deep* and the noun *depth* that he formed from it. L told M: "*as far as I remember (2.2) in the words that characterize (1.5) height, length, depth, and all of these measurement units … they will have this ending. I remembered … **length** for example … and by analogy with this word I changed **deep**.*" It appears then that L's reflection echoes the way his performance was co-constructed with M a year-and-a-half earlier. This time, however, L is fully responsible for his own performance.

To summarize, the process of mediation negotiated by M and L was contingent upon (a) M's efforts to make available a range of moves such as reminders of the task's directions, metalinguistic terms and explanations, and examples rather than simply applying a single corrective feedback strategy; and (b) L's contributions that went beyond re-attempting the item, instead involving active engagement in the process. Consequently, the mediation process afforded insights into L's knowledge and abilities, identified the precise extent of support he required, and created an opportunity to model how he worked through morphological transformations in the future. We now turn to the second project that showcases how a similar approach to mediation may be undertaken with learners in order to trace their developmental trajectories.

2 Computerized DA of Wh- Question Formation

This project targeted learners' ability to formulate wh-questions with auxiliaries in English. Learners were L1 Russian-speakers recruited from a secondary school in Estonia who, at the time of the study, had been learning English for about five years. In total, 47 learners participated in the project, although we limit our discussion here to those randomly assigned to the computerized DA condition (n = 25). The remaining learners were assigned to the control group and completed the same pretest and posttest as the experimental group. However, rather than completing the C-DA exercises under a mediation condition, they only received feedback that their response was correct or incorrect (for full details see Leontjev, 2016). The pre- and posttest provided baseline measures of learner independent performance immediately prior to and one week following the dynamic procedure. The pre- and posttest were identical so that any change in learner unassisted performance could be meaningfully compared. These independent measures required participants to write questions in an email following a list of prompts provided in Russian and to complete a gap-filling exercise inserting appropriate auxiliaries and main verbs (main verbs provided in parenthesis in Russian) to complete questions.

The C-DA procedure was administered in one session immediately after the pretest. The time learners required to complete the C-DA ranged from nine to twenty-four minutes. The C-DA included five exercises, each containing seven items: two ordering exercises targeting the word order in *wh-questions* with modal auxiliaries and three multiple-choice exercises eliciting

wh-questions with auxiliaries *do*, *does*, and *did* respectively. For each exercise, five mediating prompts were scripted in advance, arranged from most implicit to most explicit, and automatically delivered to learners by the computer program one-at-a-time when they incorrectly responded to an item. In this way, a learner proceeded from item to item in the exercise without receiving any prompts (except for the message "Correct!" before the next item was presented) until s/he produced an error. When a learner answered incorrectly, regardless of whether it was the first or last item in an exercise, the first (most implicit) mediating prompt was given before the learner moved to the next item. If that was the only mistake the learner made in an exercise, then the learner received no additional prompts. If, however, the learner answered subsequent items incorrectly, then increasingly explicit prompts were given for each of those responses. Specifically, a learner who answered a second item incorrectly received the second (slightly more explicit) prompt, a learner who answered a third item incorrectly was given the third (even more explicit) prompt, and so on. The precise content of the prompts varied depending upon the focus of each exercise and the learners' mistakes, but the general format was as follows:

1) an implicit 'think more carefully' message;
2) the location of the mistake narrowed down by means of bold highlighting;
3) a metalinguistic clue;
4) an example sentence containing the correct structure;
5) explicit explanation of the language feature and overt correction.

Although there were seven items in each exercise, if a learner received all five mediating prompts before reaching the final item, s/he simply moved on to the next set of exercises. Thus, in some cases students only completed five or six of the seven items in a given exercise. The reason for this is that the fifth and final prompt is so explicit that it seemed little diagnostic information would be obtained by allowing learners to attempt subsequent items in that exercise.

For the data analysis, learner performance on the C-DA was weighted to reflect whether, how much, and at which point in the exercise they required mediation during each exercise. Answering item 1 correctly awarded the learner 7 points, item 2, 6 points, and so on, with item 7 valued at 1 point. In this way, a learner who answered every item in an exercise correctly received 28 points while a learner who required mediation on every item received 0 points. Given that every item within an exercise followed the same structure and targeted the same *wh-questions* and auxiliaries, this approach allowed for quick differentiation of learners who, for instance, may have received prompts early in the procedure from those who required support throughout or who simply made a single mistake at some point while working through an exercise. The sum of the weighted scores across all five exercises (the total possible score being 140) formed the variable used in the correlational analyses to be discussed. This variable had a mean of 68.9 and a median of 62 (Min = 8; Max = 129).

Analysis revealed that, as a group, learners benefited from mediation during the C-DA procedure. Figure 1 captures learner improvement as they proceeded from one exercise to the next during the procedure. With regard to learner performance during C-DA, if we consider learner control of *wh*- questions with auxiliaries as a single construct, examining weighted scores on the five exercises brings to light whether learners showed signs of internalizing mediation during one exercise and transferring it, or 'carrying it forward', to the next. Of course, given that the focus of the items was not identical from one exercise to another (e.g., 'do' in Exercise 3 and

‘does’ in Exercise 4), this introduces the possibility that certain exercises were more or less challenging for individual learners. It is therefore an open question as to whether the clear upward trend in learner performance from one exercise to the next could be due to the exercises having been arranged in an order that the learners happened to find decreasingly difficult regardless of the mediation. While this may be unlikely, the data do not permit us to eliminate this as a possibility.

In Figure 1, the mean weighted scores for each of the five exercises are displayed (Note Exercise 1 - modal auxiliary with pronoun as subject; Exercise 2 - modal auxiliary with noun as subject; Exercise 3 - auxiliary as ‘do’; Exercise 4 - auxiliary as ‘does’; and Exercise 5 - auxiliary as ‘did’).

[Insert Figure 1.]

Figure 1. Learner mean weighted scores across the 5 exercises in C-DA.

It appears then that, as a group, learners did indeed evidence improved control over *wh*-question formation with auxiliaries as they progressed through the procedure. Put simply, they *learned* over the course of the assessment. Beyond that, two additional observations may be made. First, there was almost no difference between the learners’ mediated performance on the ‘do-’ and the ‘does-’ exercises (Exercises 3 and 4) and there was a notable increase in the mediated performance on the ‘did’ exercise (Exercise 5). One explanation concerns the transfer of student learning within the procedure. Specifically, learning to move the third person singular aspect *-s* from the main verb to the auxiliary (during Exercise 4) proved demanding for learners. Once they understood the necessary transformation, they were then able to complete Exercise 5 with less reliance on mediation.

The inclusion of pre- and posttests of learner control over the targeted structures that did not include mediation and required learners to complete sentences themselves allowed for additional insights into changes in learner abilities over time. Table 1 captures the performance of the learners as a group. Scores were calculated according to the total number of correctly formed *wh*-questions with auxiliaries by each individual learner across both exercises of the pre- and posttests. Scores for individual participants are available in Appendix B.

Table 1. Learners’ pretest and posttest performance.

	Mean	S.D.	Median	Min	Max
Pretest no. correct*	4.12	4.18	3	0	12
Posttest no. correct*	5.32	4.25	4	0	13
Change: posttest-pretest	1.2	2.58	1	-5	8

Notes. *k = 14.

We note that the change in mean scores from the pre- to posttest indicates changes to learner unassisted performance following the C-DA. The degree of change evidenced (1.2) is quite small, although it is worth keeping in mind that as an intervention, the mediation process was quite brief, involving only a single, rather short session. Moreover, the fact that learners actually had to compose constructions or full sentences with the necessary auxiliaries and main verbs on the pre- and posttests rather than selecting the correct structure from a set of options as in the C-DA procedure may have also rendered these independent measures more difficult for learners and therefore not fully captured gains that learners made. Nonetheless, Table 1 shows that as a group, the learners did improve their unassisted performance following the C-DA, meaning that the mediation directed their development. Of course, it is the case that not all participants showed improvement. While fifteen learners improved, four experienced decline (see Appendix B). As we discuss later, it is such variation that a mediational process helps to uncover.

To further investigate the relationship between learners' unassisted and C-DA performances, Spearman's correlations were calculated between C-DA scores (as a whole), and pretest scores, posttest scores, and overall changes in performance (Table 2).

Table 2. Correlation between learner C-DA performance, unassisted performances, and improvement.

		pretest: no. correct of wh-questions with aux	posttest: no. correct of wh-questions with aux	diff. in the no. of correct wh-questions (posttest - pretest)
Learners' C-DA weighted performance	Spearman's rho	.586	.611	.190
	Sig. (2-tailed)	.002	.001	.364

The correlation between the variable representing change in learners' unassisted performance between the pre- and posttests and their C-DA performance was small and not significant, and a moderate correlation was found between the C-DA performance and unassisted pretest and posttest performance. We wish to point out, however, that the lack of strong correlations between the unassisted and the mediated level of performance is not necessarily problematic from the perspective of the ZPD, which presumes change rather than stability. Indeed, Vygotsky (1978) explained individuals with a similar independent level of functioning may have quite different levels of emerging abilities, that is, they might differ with regard to the ZPD. There is some evidence of this in the present study.

With regard to variability among learners' developmental trajectories, consider Learners 4 and 12 (see also Appendix B). Learner 4 formed three questions correctly during the pretest but

scored 118 on the C-DA, the fifth highest C-DA score (indicating that she required very little mediation). On the posttest, her performance improved as she correctly formulated five questions. Learner 4's trajectory thus evidenced improvement with very little mediation during the C-DA (her median mediation level was 1). In contrast, Learner 12 formed two questions correctly during the pretest and scored only 45 on the C-DA (the median mediation level of 5). While this individual required far more mediation during the C-DA, he similarly improved his posttest score by two. The point is not that all variance among the scores can be explained in this way, but rather that it is possible to discern within the brief timeframe in this study different trajectories emerging as learners encounter tasks that are beyond their independent capabilities; as they engage in a mediational process in which support of varying degrees of explicitness is provided not simply for the purpose of guiding them to the right answer but to help them to understand relevant patterns in the language; and finally, as they bring to bear what they have learned when they then complete language tasks independently.

IV Discussion and Conclusion

The two studies we have reported contribute to the growing research on L2 DA by documenting applications of mediation to two distinct contexts: one-to-one interactions, characteristic of tutoring and classroom settings, and the computerized administration of a standardized test reminiscent of more formal assessment situations. Together, the studies offer evidence of the view expressed earlier that DA offers more than a way of engaging in formative assessment and that it in fact opens the possibility to a reconceptualization of the role of assessment in education more generally. Specifically, integrating mediation in assessment situations brings together teaching, classroom assessments, and testing in a principled and coherent manner. Errors and the responses to them from teachers/assessors and from learners themselves become opportunities for gathering information concerning the extent of learner current understanding and how it may change over time (assessment) as well as for providing targeted support to improve learner knowledge of and control over the language (teaching). The two studies we report are part of an ongoing effort to realize an orientation to L2 education that is rooted in mediation as a process undertaken with learners.

This orientation, while informed by SCT, may offer a valuable point of shared interest among scholars interested in mediation and SLA researchers pursuing corrective feedback. An extensive body of work explores the use of various corrective feedback strategies with learners at different levels of language proficiency. This would seem to be an area that SCT scholars would do well to take into consideration when devising interactional approaches to mediation and in particular to determining how mediation might be scripted in advance and delivered automatically through computerized procedures. At the same time, assessment that includes mediation as an integral feature of the activity offers a new set of questions for corrective feedback scholars. That is, in addition to asking how specific strategies might be employed as corrections, emphasizing their efficacy in improving learner independent functioning, researchers might also examine what they reveal about learner difficulties, partial understandings, and emerging abilities when they are used for more diagnostic purposes. The value of such diagnostic insights for guiding ongoing instruction is a topic that merits further research. Indeed, studies that directly compare a mediation process, as occurs in DA, with ones in which explicit corrective feedback is provided in response to learner errors can help to

advance our understanding of the picture of learner abilities that emerges through both approaches and how these may impact teacher practices, particularly as the time required to engage in a mediational process is greater than that needed to simply correct an error. Extending beyond instructional situations, a menu of feedback strategies made available to learners during a test procedure also creates interesting opportunities for understanding how they may be relevant to particular populations of learners at specific points of L2 development.

In language classrooms, an orientation that emphasizes a process of mediation offers a point of departure for targeted instruction or planning for subsequent work. For instance, in the one-to-one DA study we reported, qualitative analysis of mediator-learner dialoguing from their initial DA session to one a week later revealed changes in L's understanding of the English suffix -*th* to form substantives and his ability to control that feature of the language. This change was not evident in L's independent performance as he failed to complete the tasks on his own. Application of a single corrective feedback strategy would likely not have detected this shift in L's emerging ability. Although, of course, we cannot be certain, it is an open question as to whether any such shift would even have occurred if L had been offered only a particular form of corrective feedback during the first session with M rather than engaging in an extensive mediational process. Again, our point is not to draw comparisons between particular forms of corrective feedback and a mediational process but rather to examine how the latter may advance what we understand to be the ultimate goal of both approaches: helping learners move toward more successful independent functioning in the L2. A diagnosis achieved through interaction that reveals changes in learner understanding, whether subtle or pronounced, gradual or sudden, appears highly relevant to that goal.

With regard to testing situations, the C-DA study similarly examined changes to the quality of mediation learners required but it also included learner independent functioning at different points in time as part of the emerging picture of learner development. Considering learner engagement across the C-DA exercises allowed for identification of clear changes in the extent to which they relied upon the computerized support, indicating changes during the course of the assessment. Their improvement as a group was further evidenced by modest changes observed between their pre- and posttest scores, reflecting their reliance upon their current knowledge to regulate their functioning. Importantly, it was not the case that learner development was studied from the vantage of only posttest scores, only changes between the pre- and posttests, or even only performance during the C-DA. Rather, it was all of these taken together that allowed for identification of learner developmental trajectories. In our view, the findings we report further underscore the need to broaden the lens through which learner abilities are viewed to include the processes through which their capacity to self-regulate and their engagement with external support changes along particular timescales and how these changes may be detected according to the extent of external feedback or mediation they require. As Lantolf, Kurtz, and Kisselev (2016) explained, following Vygotsky, SCT conceives of development as not necessarily following a smooth progression of incremental, lock-step improvement. While this is possible, it is also the case that development occurs through sudden and more dramatic advances or, conversely, that individuals may evidence decreases in performance within an overall forward developmental trend. To be sure, not all variability in performance can simply be attributed to this model of development, and more research is needed to better understand the developmental trajectories L2 learners may follow and the role and limits of instruction in influencing them.

The results of these studies provide some evidence of the value of a mediation approach to engaging with L2 learners, and it is our hope that they will be of interest not only to SLA researchers but also to language teachers and teacher educators. Teachers consulting the research literature may indeed encounter conflicting findings, with studies emphasizing, for instance, the merits of explicit forms of corrective feedback over implicit forms or vice-versa. Framed as a mediation process, a message to teachers may be that explicit and implicit corrective feedback strategies exist on a continuum and that both have relevance to practice. The question is when to employ them. Rather than a simple, prescriptive rule, a process orientation empowers teachers to make this determination for themselves according to their interpretation of learner responsiveness and needs as these become apparent over the course of particular activities. Considering the value of this process for supporting learners during instruction and also as a way to monitor their progress over time – that is, as a form of classroom-based assessment – is an added dimension that can be brought to the attention of teachers with an aim of helping them to understand that learners who perform independently in similar ways may still differ with regard to the forms of feedback and support they require to progress.

Classroom teachers did not feature in the two studies we have reported, and we regard this as a limitation. In our view, engaging with teachers is absolutely critical to the continued development of our understanding of how mediation can support the development of all learners. Pre-service and in-service professional development activities offer opportunities to introduce theoretical principles and share examples of those principles in L2 instructional contexts (see, for instance, Lantolf & Poehner, 2011). As those most directly involved with learners on a regular basis, teachers are uniquely positioned to realize a more cooperative culture of L2 assessment and instruction.

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APPENDIX A. Transcription markings.

Symbol	Meaning
teXT	a stressed word or a part of it in capital letters
?	slightly rising intonation, not necessarily a question
↑	noticeably rising intonation
↓	falling intonation
A: [text] *B:* [text]	overlapping utterances
(.)	pause of 0.2 seconds or less
(0.0)	timed pause
:	elongation of the preceding sound
text-	an utterance is cut off
°text°	uttered in a noticeably quieter, softer voice
((text))	comment
text	originally in English
/tɛkst/	phonetic transcription using International Phonetic Alphabet

APPENDIX B. Group study learners' pretest, posttest, and C-DA scores.

Learner no.	Pretest	C-DA	Posttest
1	3	62	1
2	1	56	4
3	0	8	0
4	3	118	5
5	0	69	0
6	0	84	3
7	0	49	0
8	5	37	5
9	0	38	4
10	0	54	4
11	0	44	1
12	2	45	4
13	0	31	0
14	2	56	5
15	8	104	10

16	7	79	2
17	1	80	9
18	6	38	7
19	8	81	11
20	12	129	13
21	10	122	13
22	8	88	8
23	12	126	13
24	5	77	4
25	10	47	7