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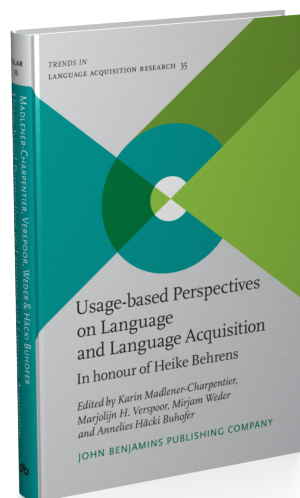
Usage-based Perspectives on Language and Language Acquisition: In honour of Heike Behrens

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Usage and context in pediatric speech and language therapy

Helping children with oral developmental language disorder build their language system(s)

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Parallel to the rise of usage-based, emergentist, and constructivist theories on language acquisition over the last decades, context and usage have also come into focus in the area of speech-language therapy (SLT), where the traditional medical model of a “specialist fixing the patient’s speech and language system” is increasingly called into question. Focusing on oral language disorders in monolingual and bilingual children, in particular developmental language disorder (DLD), I will detail the role of the cognitive underpinnings and of the linguistic and socio-interactional context, both for more theoretical research on the nature of these disorders and for applied research on SLT assessment, intervention, and prevention.

Keywords: usage-based, speech and language therapy, developmental language disorder, language assessment, language intervention

1. Introduction

Over the last decades, usage-based (UB), emergentist, and constructivist theories have highlighted the importance of usage and context for typical language acquisition (cf. Slobin, 2026 this volume). As Tomasello (2003) puts it, “all things flow from the actual usage events in which people communicate linguistically with one another” (p.61). Tomasello (2003) sees language development as a gradual abstraction process, where children start out, in their first communicative interactions, with very crude, item-based imitations of words and chunks in the input, that slowly expand into more flexible constructions and patterns, by integrating more information and variability from the input. Over the last decades, many

phenomena across diverse linguistic domains have been explained in this more functional approach.

Early UB language acquisition research studied adult-child interactional events with a “strong focus on the individual mind and the quantitative properties of the input” (Behrens & Pfänder, 2022, p. 220), that is, on the frequency and distribution of different constructional units that influence memorization, such as chunks and slot-and-frame patterns. Recent work also considers the actual, online interactional context to a greater extent, including multimodal cues such as eye-gaze, pointing and gesture, showing how adult and child interlocutors adjust to one another, giving and receiving feedback and creating structural alignment and variation sets (Behrens & Pfänder, 2022; cf. Klatt & Pfänder, 2026 this volume). Grounded in cognitive linguistics, UB approaches recognize the importance of the psychologically attested learning mechanisms that children bring to this task (Tomasello, 2003). Furthermore, Poll (2011) stresses the role of the child as an “active user and processor of input” (p. 6), rather than a passive listener, in emergentist theories (cf. Rowland, 2026 this volume).

Yet, the application of UB and emergentist theories to language disorders has been quite sparse. Being “relatively new”, these theories fare amongst the least known theoretical approaches by speech and language therapy (SLT) clinicians across Europe (Saldaña & Murphy, 2019), and SLT research explicitly identifying as UB or emergentist is very rare (but see Evans, 2001; Poll, 2011). This is unfortunate, because a constructivist focus “on the child’s ability to generalize over the input” (Behrens, 2021, p. 959) seems very suited to help solving the often-described challenge of generalization and transfer in speech and language therapy (e.g. Schelstraete, Bragard, Collette, Nossent, & Van Schendel, 2010): Patients often show progress for specific items and tasks in the clinic, which unfortunately does not translate into improvements for other items, tasks, and everyday life skills.

Nevertheless, context and usage in a broader sense have also come into focus in the recent SLT literature, as *common factors* (Kohnert, Ebert & Pham, 2021), *implementation context*, *clinical state and circumstances*, or *environment* are increasingly being included as critical dimensions for decision-making in models of evidence-based practice (see Watson, Adams, Shue, Coates, McGuire, Cheshier, Jackson et al., 2018, for a review). In the health domain in general, the focus is currently changing from a traditional biomedical model, defining illnesses and disorders centered on the individual who carries them, to more psychosocial characterizations, shifting the focus to functional impairments in the individual’s daily life, which also depend on their surroundings. Indeed, in bioecological models (e.g. Bronfenbrenner & Morris, 2007), different spheres of the environment, and the child’s interactions within and across these, are central for development.

Applying this notion to SLT in children, functional impairments constitute a key part of the definition of *speech, language and communication needs* (SLCN), a newly coined umbrella term which is characterized as “difficulty producing or understanding language that affects every day functioning” (Bishop, Snowling, Thompson, Greenhalgh, & Klee, 2017, p.1075).

1.1 Developmental language disorder

Although usage and context should certainly be considered for all SLCN, here I will focus on *developmental language disorder* (DLD), one of the most frequent and well-studied SLCN. An international expert panel (Bishop et al., 2017) has recently agreed upon the term DLD as a single diagnostic label for persistent childhood language difficulties of unknown origin.¹ Adopting this consensus, the latest version of the International Classification of Diseases (ICD-11, World Health Organization, 2022) describes DLD (Code: 6A01.2) as

characterized by persistent deficits in the acquisition, understanding, production or use of language (spoken or signed), that arise during the developmental period, typically during early childhood, and cause significant limitations in the individual's ability to communicate. The individual's ability to understand, produce or use language is markedly below what would be expected given the individual's age. The language deficits are not explained by another neurodevelopmental disorder or a sensory impairment or neurological condition, including the effects of brain injury or infection.

Typical language difficulties (cf. Bishop et al., 2017; Leonard, 2014) include the following:

- *Phonology*: persistent phonological errors impacting intelligibility, impairments in phonological awareness
- *Lexicon*: slow and poor vocabulary development, word finding difficulties
- *Grammar*: omissions and substitutions of function words and morphemes, production of short and rigid sentence structures, difficulties interpreting meaning conveyed by grammatical contrasts

1. Despite considerable heterogeneity in the DLD population, Bishop and colleagues (2017) decided to collapse the previous categories of ‘*specific*’ / ‘*primary language impairment*’ (SLI or PLI) and ‘*language delay*’, and to resist divisions into subgroups by modality (comprehension vs. production) or by linguistic domain (phonology, lexicon, grammar, discourse), as no consistent boundaries could be established and most patients’ profiles fluctuate during the course of development (e.g. Conti-Ramsden & Botting, 1999). Instead, they call for a precise characterization of every DLD child’s language profile, highlighting individual strengths and weaknesses.

- *Discourse-pragmatics*: production of narrative sequences that seem disconnected and hard to follow, providing too much or too little information to a conversational partner
- *Verbal learning and memory*: verbal short-term memory difficulties.

Despite decades of research, the precise causes of DLD remain unknown (Bishop et al., 2017). Widely documented risk factors include pregnancy and birth complications, prematurity, a family history of language disorders, being male, being the youngest sibling, and having caregivers with low education levels (see meta-analysis by Rudolph, 2017).

Overall, DLD concerns around 3–7% of children, depending on age and precise definition (Bishop et al., 2017). Similar numbers are to be expected for mono- and bilingual children, although the differentiation of DLD from typical, early stages of development in the latter population remains one of the biggest challenges in the SLT clinic today (e.g. Kohnert et al., 2021; Skoruppa, 2025). Although bilingualism² is not the main focus of this paper, I will include it in my considerations as a major contextual factor, as a large percentage of children nowadays grow up with more than one language and make up a large proportion, if not the majority, of SLT clinicians' clientele (e.g. Kohnert et al., 2021; Skoruppa, 2025).

1.2 Chapter outline

In the following, I will review the role of the *cognitive underpinnings* (learning mechanisms) (Section 2), the *linguistic context* (input) (Section 3), and the *socio-interactional context* of language acquisition in children with DLD (Section 4), separating these three aspects somewhat arbitrarily. I will draw on specific UB and emergentist papers where available, and supplement with my own clinical work as well as my reading of the wider literature. I will structure this review around four main professional activities carried out by SLT clinicians,³ that is, *research into the nature of the disorder*, but also into *assessment*, *intervention*, and *prevention*. Specifically, I will first elaborate how each of these aspects may help with understanding the nature of the underlying deficit (or deficits) in children with DLDs, and then discuss implications for language assessment. Finally, I will explain the importance of each aspect for intervention in children with DLD and for preven-

2. Following contemporary inclusive definitions of bi- and multilingualism based on language use rather than age or proficiency (e.g. Kohnert et al., 2021, Skoruppa, 2025), 'bilingual' will refer to all children growing up exposed to two or more languages regularly in their daily life.

3. These four activities are as defined in the professional profile of the European SLT association (CPLOL, 1997).

tion in children at risk of developing this disorder (e.g. late talkers, children in vulnerable socio-economic contexts). I will conclude in Section 5 by bringing the three aspects together and by highlighting further applications and extensions.⁴

2. Cognitive underpinnings

Over the last decades, a wealth of research has assessed the contribution of several specific cognitive skills to explaining typical patterns of difficulties in children with DLD. Here, I will provide a brief summary of these results, before turning to their application in the three different SLT activities mentioned above (Assessment, Intervention, and Prevention).

2.1 Nature of the disorder

Despite the fact that DLD is largely an exclusion diagnosis (see ICD-11 definition above), nowadays there is wide-spread agreement that the root of children's language difficulties is likely to be found in the cognitive learning mechanisms responsible for language acquisition (Bishop et al., 2017). Many researchers assume that DLD involves inefficient sequential statistical learning in the auditory-verbal domain, which is often understood as a subcomponent of the implicit procedural learning system (see West, Melby-Lervåg, & Hulme, 2021). That children with DLD show working memory deficits (Montgomery, Gillam, & Evans, 2021) and slow processing speeds (Zapparrata, Brooks, & Ober, 2023) is largely undisputed,⁵ but any causal interpretation is still subject to debate.⁶

4. I will present a narrative (rather than exhaustive or systematic) review of the literature. Like all writing, this will be influenced by my own perspectives and experiences of language acquisition and SLT research in different European countries (Germany, France, UK, and Switzerland), which may (or may not) correspond or be transferable to the readers' situation. In line with the language in which this article is written, I will mainly draw on literature and examples in English but occasionally cite work in French and German.

5. Note that further studies also document other non-linguistic deficits, including in acoustic perception (e.g. Richards & Goswami, 2015), executive functioning, such as inhibition and cognitive flexibility (for a review see Pauls & Archibald, 2016), sustained attention (for a review see Ebert & Kohnert, 2011), and analogical reasoning (e.g. Krzemien, Thibaut, & Maillart, 2020). However, these deficits remain more controversial because they may be quite small for non-verbal stimuli, or are present only in subgroups of children with DLD.

6. Jones and Westermann (2022), for instance, argue that these deficits could be a consequence rather than a cause of the cognitive overload due to the difficulty of dealing with poorly specified linguistic representations.

If, as assumed in UB accounts (Tomasello, 2003), the abstraction process during language development is seen as gradual, it is easy to model how such inefficient learning mechanisms can lead to lower usage flexibility and over-reliance on input chunks. This, in turn, would explain why children with DLD typically rely on a smaller number of sentence structures which they use in a more rigid way than typically developing (TD) children, without being totally inflexible in their productions. Thus, UB theories can contribute to a more precise characterization of the language learning deficits in children with DLD than all-or-nothing rule-based accounts, which traditionally assumed that learning in children with DLD must be entirely based on *rote learning* (Gopnik, 1994) if the rules governing certain language phenomena are inaccessible to them.

Evans (2001) further explains how processing deficits could lead both to certain typical error patterns and to variability in an emergentist account:

deficits in speech perception, working memory, or slower processing speed would place children [...] at a greater risk of mapping the statistical properties of low frequency information at the acoustic level of the speech stream or probabilistic constraints inherent in relational information at the level of the sentence.
(p.49)

They thus need considerably more exposure to use language structures flexibly than typically developing children (e.g. Poll, 2011). Furthermore, “less well-established patterns will be more vulnerable to external influences and will require more energy for the child to maintain” (Evans, 2001, p.48), which may explain the often-observed lack of generalization and flexibility in children with DLD. In order to meet everyday communicative demands despite these weaknesses, these children will then follow the “developmental trajectory of *least resistance* [...], resulting instead in the acquisition of more adaptive communicative strategies” (p.48). This could explain the typical over-reliance on well-known but simpler items or constructions in children with DLD (e.g. producing series of short, unconnected sentences instead of complex sentences in narration tasks).

2.2 Assessment

Most traditional SLT assessment batteries do not directly test the aforementioned processing and learning mechanisms, but aim at establishing the “sum” of a child’s knowledge in different linguistic domains in order to assess their developmental progress. However, in recent years, phonological working memory testing via nonword repetition tasks has been confirmed as a reliable diagnostic marker of DLD in both monolingual and bilingual children (e.g. review by Schwob, Eddé, Jacquin, Leboulanger, Picard, Ramos Oliveira, & Skoruppa, 2021) for whom the

traditional approach runs into problems because of their variable exposure to a given language.⁷

Processing speed and effort are usually only assessed informally by clinicians, but the ongoing digitization of tests calls for the collection and analysis of more precise and standardized reaction time measurements (Zapparrata et al., 2023).

Furthermore, some researchers attempt to test directly how children learn new language structures from controlled input in the clinic, using so-called *dynamic assessment* (see review by Orellana, Wada, & Gillam, 2019). Although the amount of new information that can be learned during such short learning sessions is quite limited and these procedures are notoriously difficult to standardize and norm, they offer an interesting perspective for DLD diagnosis in children with varying input (i.e. bilinguals).

Finally, most standardized assessment procedures assign a rather passive, respondent role to the child, which seems at odds with the idea of an *active user and processor* (Poll, 2011) in emergentist accounts. Providing feedback dynamically (see above) and embedding assessment in (digital) games centered around the child can encourage children to take a more active role and demonstrate their full repertoire of communicative strategies (e.g. Roche, Jessen, Weidinger, Behrens, Haberzettl, Hasselhorn, Ifenthaler et al., 2016). For children who are at least somewhat aware of their language difficulties, it can be very beneficial to explore their own perception of these difficulties, and their impact on their daily life, using age-appropriate check-lists, visualizations, and metaphors (for examples see Crenshaw, 2008; Praz-Pitteloud, 2010). This can help them to understand the purpose of the assessment activities and to engage with the therapeutic process from the start.

2.3 Intervention

A number of non-linguistic interventions targeting the general cognitive mechanisms mentioned above, particularly working memory, have been used successfully with children with DLD. However, the effects are generally short-lived and do not necessarily translate to the verbal domain (see meta-analysis by Melby-Lervåg & Hulme, 2013), unless the specific connection between working memory and the targeted linguistic skill is very clear (e.g. Delage, Stanford, & Durrleman, 2021, for complex syntax).

Yet, with respect to processing demands, Evans (2001) describes that some children with DLD can produce “longer, more complex utterances with increased

7. Contemporary test batteries typically do not include other non-linguistic tasks, possibly due to their weak individual diagnostic accuracy (see footnote 5).

response times” (p.49) and omit function words and morphemes “only at points in spontaneous discourse where processing demands were the greatest” (p.49). This emphasizes the need to give these children more time and to reduce pressure in everyday communication, which may sound simple but certainly constitutes no little challenge given the often hectic schedules in modern family and education contexts.

Since implicit learning mechanisms are less efficient in children with DLD, SLT clinicians often draw on their explicit learning resources, roughly from school age onwards, as they prove to be more efficient in SLT for children with more persistent and severe difficulties (e.g., Steele & Mills, 2011, for the lexicon, and Ebbels, 2014, for morphosyntax). However, while researchers agree that these implicit and explicit methods should be combined in order to achieve generalization and transfer to everyday life, they disagree on how and when this should take place. For grammar, Ebbels (2014) describes the rather traditional approach of first explicitly training new structures up to a certain correct production criterion (e.g. 50%), and then using them more implicitly in games and narrative activities, whereas Eisenberg (2013) proposes including more implicit and functional abilities from the start and providing “explicit explanation bubbles” when the need arises.

Furthermore, giving the child an active role during the intervention process is crucial for their therapeutic engagement (e.g. Crenshaw, 2008). Like during assessment, they can be invited to engage in meta-reflection and to take part in therapy planning and therapeutic choices in age-appropriate ways. Especially for younger children, active participation can also be achieved more indirectly by including less structured, child-led activities such as non-directive play, which increase engagement and enjoyment (Coad, Harding, Hambly, Parker, Morgan, Marshall, & Roulstone, 2020).

Finally, it is impossible to imagine that all the linguistic structures a child with DLD may ever need could be taught directly during therapy sessions. Clinicians are therefore encouraged to explore self-learning strategies with the child (e.g. strategies for discovering the meaning of new words in Motsch & Marks, 2015) and their environment (e.g. vocabulary in school: see Steele & Mills, 2011) and to develop efficient compensatory strategies for coping with communicative demands (Evans, 2001).

2.4 Prevention

To my knowledge, only working memory training (albeit in combination with other language activities) has been successfully implemented in a language support program for late-talking toddlers (Buschmann, Multhauf, Hasselhorn, &

Pietz, 2015), a population at risk of DLD. With respect to processing, parents, families, and educators of late-talking children should be given the same advice about timing and pressure in everyday communication in order to give affected children enough opportunity to practice more complex language structures calmly and avoid inefficient compensatory strategies. While it seems too early to embark on explicit learning exercises at very early ages, rich play-based activities which allow the child to actively explore new facets of form and meaning should definitely be encouraged, no matter what language they are being carried out in (Paze, Schwob, Volpin, & Skoruppa, 2021; for ideas of activities and materials for different age groups, see Bergeron-Gaudin, 2014, in French; Scharff-Rethfeldt, 2023, in German).

3. Linguistic context

The role of the linguistic context in explaining typical patterns of difficulties observed in children with DLD has also been discussed extensively on a theoretical level in recent years. As before, I will offer a synthesis of these results, before presenting first SLT applications.

3.1 Nature of the disorder

As described above, children with DLD are not completely incapable of learning new language structures, they just benefit less from the input and therefore need substantially more input to achieve the same learning effect as in children with TD. For instance, Kan and Windsor (2010) show in their meta-analysis that children with DLD need around the double amount of exposure to a new word in order to perform a form-meaning mapping compared to children without DLD. Such quantitative effects can be easily linked to UB theories, given the interplay between the power of statistical learning mechanisms and input frequency (Tomasello, 2003; for variation in typically developing children's vocabulary growth, cf. Rowland, 2026 this volume).

There has been less research into qualitative differences in the way that children with DLD use the available input. However, some studies on grammar (as summarized in Leonard & Deevey, 2017) suggest that they make use of a shorter processing window, which can lead to missing or erroneous generalizations. Interestingly, variability nevertheless seems beneficial for learning in children with DLD. For instance, long-term retention of new words is boosted after exposure to highly variable exemplars rather than a repeated single exemplar in both children with TD and DLD (Aguilar, Plante, & Sandoval, 2018).

With respect to the actual input that children with DLD receive, there is some evidence that adult interlocutors adapt to their difficulties by addressing them like younger children (Leonard & Deevey, 2017). This is generally seen as a consequence rather than a cause of the disorder, but at the same time, it reduces the variability and the complexity of the input to children with DLD, which may not be beneficial. Bilingualism in children with DLD constitutes an interesting example of how they can successfully cope with variability and complexity, since they do not lag further behind their bilingual peers with TD than their monolingual counterparts behind their monolingual peers with TD (Paradis, 2010). And even though they show less transfer effects across languages than bilingual children with TD, structures that are shared across languages (e.g. cognates,⁸ shared phonemes, or common sentence structures) can still boost development in bilingual children with DLD (Nair, Clark, Siyambalapitiya, & Reuterskiöld, 2023).

3.2 Assessment

Most formal assessments follow a rule-based logic, testing children with very few exemplars per linguistic structure, or with multiple exemplars chosen mainly based on psychometric considerations rather than psycholinguistic parameters like frequency and prototypicality. Unfortunately, such assessment does not allow for determining the degree of abstraction and flexibility the child has achieved. Clinical assessment of productivity is quite limited and mostly restricted to testing certain tense or plural morphemes via application to new, unknown, or nonsense items, in variants of the traditional *wug* test by Berko (1958).

Some test procedures do include analyses of narrations or semi-spontaneous speech in terms of phonological errors, lexical diversity, and morphosyntactic and discourse measures, giving a richer view of a child's actual linguistic repertoire. Since these are notoriously long, subjective, and thus tedious to score in the clinic, semi-automatic procedures have been devised for English (e.g. KIDEVAL in CLAN, see discussion in Garbarino, Ratner, & MacWhinney, 2020). Applications to morphologically richer and syntactically more complex languages are still under development. Furthermore, the question of how to assess the “empty space”, that is, what structures children avoid and do not even attempt to use spontaneously (discussed for example in Eisenbeiss, 2009), is particularly relevant for children with DLD in light of the numerous compensatory strategies discussed above.

8. Words with cross-linguistically similar form-meaning mappings, such as *tiger* (English) – *tigre* (French)

In order to fully understand how bi- and multilingual children make use of their variable input, testing all languages of a child is generally recommended (see Scharff-Rethfeldt, McNeilly, Laasonen, Meir, Abutbul-Oz, Smolande, Niegia Garcia Goulart et al., 2023). This helps to get a clear language profile of the child and to choose adequate intervention goals. Since such procedures are very time-consuming, the Royal College of Speech and Language Therapists (RCSLT, n.d.) calls for allocating “at least double the time for bilingual clients and their families in order to achieve the same positive outcomes as monolingual clients, and therefore deliver an equitable service” (cf. also Scharff-Rethfeldt et al., 2023). Where testing all languages is not possible, the “other” languages should at least be considered in terms of language history, exposure balance, and parental concerns, as well as linguistic similarity in order to understand the child’s potential strengths and difficulties (Kohnert et al., 2021; Skoruppa, 2025).

3.3 Intervention

Implicit intervention techniques mainly involve input enhancement and yield varying results in children with DLD. Technology-induced changes to the acoustic signal, such as the prolonging of consonants in order to highlight their role as grammatical markers, have not shown any significant learning boost (see meta-analysis on the *Fast ForWord* program by Strong, Torgerson, Torgerson, & Hulme, 2011).

However, a number of conversational strategies enhancing and enriching the use of specific structures in the input can lead to successful acquisition in children with DLD, especially in milder cases (Ebbels, 2014). On the one hand, simply boosting the frequency of targeted structures, either globally via “auditory bombardment” and modeling (very dense and repeated usage, e.g. Plante, Tucci, Nicholas, Arizmendi, & Vance, 2018), or locally via syntactic priming (e.g. Montgomery, Gillam, & Plante, 2023) can have positive effects. On the other hand, contrasting new structures with other structures via techniques like conversational recasting (reformulation of erroneously used target structures by the clinician) has also been shown to be beneficial (Ebbels, 2014). As in typical development, adequate variability is crucial for learning success during intervention: Plante, Ogilvie, Vance, Aguilar, Dailey, Meyers, Lieser et al. (2014) show that only those preschool DLD children exposed to new morphemes in a high number of verbs learned to produce them (24, rather than 12 in the low-variability condition).

Further manipulations, such as providing more overt agreement markers, avoiding long-distance agreement, and making use of high lexical variability, also show encouraging results. Leonard & Deevey (2017), for instance, describe *toy talk*, in which simple sentences with noun phrases + 3rd person singular -s (a

morpheme that English-speaking children with DLD often omit) are strategically overrepresented during play sessions. Going further into the UB direction, a treatment study on passives by Riches (2013) successfully applied the principles of *constructional grounding* (using short structures as the basis for acquiring longer structures) and *constructional conspiracy* (encouraging analogies between partially overlapping constructions) in picture descriptions and card games with two young children with DLD.

Input-enhancing techniques such as modelling and recasting are routinely taught in SLT curricula. Many language games and picture story books used by clinicians already contain repeated and contrasted structures, although often not in a very controlled way (but see Kauschke, 2022). The development of materials for different structures from a usage-based perspective and generally detailing situations and activities that require the use of specific structures in contrast (as proposed by Kauschke, 2022, and Eisenbeiss, 2009) would be of great help to clinicians. They could even be used by parents and educators in order to further increase input intensity.

With respect to bilingualism, Nair et al. (2023) conclude in their review that multilingual interventions or interventions focusing on shared structures across languages (such as cognates, similar grammatical constructions etc.) have the same treatment effects as a strictly monolingual interventions in one language, but additionally help generalizing to the other language(s). This is very promising for cross-linguistic SLT, but again, specific bilingual materials or materials focusing on common shared structures remain to be constructed.

3.4 Prevention

Prevention of oral language disorders mainly aims at increasing input quantity and quality as a protective factor in at-risk groups. Recent work has shown that this cannot start too early, as changes to the acoustic environment even in the incubators in neonatal units (playing of maternal speech in the incubator) can have a positive effect on premature babies' development (e.g. Webb, Heller, Benson, & Lahav, 2015). Parental training for interacting and commenting in everyday situations with their baby and, later, for modelling and recasting their toddler's productions (for scaffolding, cf. Klatt & Pfänder, 2026 this volume), can be effective and have a positive effect on children's language skills, especially vocabulary, in various at-risk groups (Roberts & Kaiser, 2011). Similar training programs for early childhood educators have been shown to be effective as well (Kern & Fekete, 2019), and the same principles can be applied to bi- and multilingual children in each of their languages (Paze et al., 2021).

4. Socio-interactional context

Finally, although the social-interactional context has gained prominence in UB theories on language learning and DLD only recently, this dimension has always been very important for SLT clinicians to establish a “therapeutic alliance” (e.g. Sylvestre & Gobeil, 2020) with their clients and their families. As above, I will first sum up theoretical advances, before highlighting recent developments and challenges in the SLT clinic.

4.1 Nature of the disorder

Even if most risk factors for DLD, as reported in Rudolph’s (2017) meta-analysis, are biological, the fact that low parental education also fares among the significant predictors of language disorders underlines the importance of environmental influences. The most common explanation of this influence links it to the socio-interactional context, observing that parents with low education tend to engage less in meaningful communicative interactions with their children, leading to a large, quantitative and qualitative, “input gap” (e.g. Hart & Risley, 1995).⁹ This resonates with recent UB work focusing on the interactional context (Behrens & Pfänder, 2022). Furthermore, Rudolph (2017) points out that there may be other environmental risk factors¹⁰ that not all studies in her meta-analysis were able to measure in a unified fashion.

Recently, there has been considerable debate as to whether screen time can be considered a risk factor, too. Although less than half of the studies in a recent systematic review find detrimental effects of screen time on language overall (Streegan, Luge, & Morato-Espino, 2022), more fine-grained analyses reveal that it is time spent on screens alone, without the possibility to discuss the content with others, that correlates negatively with language abilities (Mustonen, Torppa, & Stolt, 2022) and constitutes a risk factor for DLD (Collet, Gagnière, Rousseau,

9. However, these differences vary depending on the situation and are washed out in interaction-prone activities such as shared book-reading (e.g. Hoff-Ginsberg, 1991). Furthermore, most studies do not take into account the higher number of interactions with caregivers other than the parents, and with other children, that are typical for larger families with diverse cultural and socio-economic backgrounds. Recent studies show that these can at least partially make up for ‘missing’ interactions with parents, and attenuate the “input gap” (see, for instance, Sperry, Sperry & Miller, 2019 for the USA; Alam, Rosemberg, Garber, & Stein, 2022 for Argentina; and Coffey, Sneder, & Spelke, 2024 for Ghana).

10. Reviews of studies focusing on negative circumstances, such as chronic maternal depression (Sohr-Preston & Scaramella, 2006), or maltreatment such as abuse and neglect (Sylvestre, Bussi eres, & Bouchard, 2016) also report negative effects on children’s language development.

Chapron, Fiquet, & Certain, 2019). Thus, it does not seem to be the use of digital media itself that is detrimental, but rather the lack of meaningful interaction that unfortunately often comes with it.

Last but not least, it is important to stress that most studies on socio-interactive risk factors for DLD report mere negative correlations with language development, often not assessing whether these go as far as posing a real risk to develop into a DLD. Thus, since causal connections in this domain are very hard to establish with mainly observational studies, clinicians should be very cautious when discussing socio-interactive difficulties with parents and other professionals, in order to avoid blaming and stigmatizing already disadvantaged groups.

4.2 Assessment

With few exceptions, standardized SLT assessments usually target an individual child's knowledge of specific sounds, words, or constructions abstractly, without considering the interlocutor or the situational context. Typically, the child is asked to respond to pre-formulated prompts by a neutral (and often unfamiliar) examiner in an item-by-item fashion with no true communicative intention, and is typically given only one opportunity to reply, with few or no practice items. This constitutes a stark contrast to typical communication situations that children find themselves in, in which they interact with collaborative adults who ask questions that do correspond to true communicative needs, and often provide multiple prompts and scaffolding if these are not met (see Behrens, Madlener, & Skoruppa, 2016). It is thus unsurprising that such assessments are often uncomfortable for young children and clinicians alike, and can underestimate young children's capabilities, especially if they are very shy and/or from socio-culturally diverse backgrounds where such situations are not the norm (e.g. Rodekohr & Haynes, 2001, for children with Afro-American dialects, and Wei, Miller, Dodd, & Hua, 2005, for children from non-Western backgrounds).

Over the last decades, numerous ways of making SLT assessments more interactive and thus more ecological have been explored, although not all have been able to meet the stringent psychometric demands common in test development. First, abstract language tasks have often been embedded in small analog or digital games, where every item helps friendly characters to proceed, and/or in a coherent storyline, often linking different tasks in a test battery. More radically, some authors (e.g. Petersen & Spencer, 2014) even propose to skip targeted sub-tasks and switch directly to narrative-based assessments, since they indirectly test all lower linguistic levels (sounds, words, sentences), but such tasks may prove to be too complex for very low proficient children.

Second, the role of the interlocutor is also evolving, with some tests offering the possibility to help children when they are struggling by providing graduated cues (e.g. semantic hints or first phonemes) after an initial incorrect or absent response. Such mediation seems particularly important during dynamic assessment tasks (see Schwob, Tillé, & Skoruppa, 2024), since learning new materials autonomously is very hard even for TD children, frequently leading to floor effects. In contrast, the use of digital avatars as communication partners also offers the possibility to put the child in an expert position from which they direct the character, creating a true communicative situation (Roche et al., 2016).

Finally, SLT clinicians have long recognized the limitations of standardized testing and supplemented it with various more informal observations of the child in different situations, for instance while interacting with an examiner, their parents, a teacher or educator, or their peers (e.g. de Weck & Marro, 2010). In order to systematize and quantify such observations and to avoid anecdotal overinterpretations, questionnaires, and checklists (e.g. on pragmatics) for clinicians, parents and/or teachers/educators have been developed and sometimes included in test batteries. However, these should be interpreted with caution since they can also be influenced by systematic biases in respondents, such as the well-known social desirability bias (Edwards, 1957). In addition, observation of peer interactions, for instance in the classroom, in small groups, or with friends and siblings, is very valuable to determine how a child communicates when not relying on proficient adults, and to assess the full functional impact of a child's language difficulties. Such situations may also be more beneficial for children who are extremely shy around unfamiliar adults and can save time per child when included in universal screening procedures. These are important to implement from an early age in order to avoid inequalities in SLT service delivery through under-detection (e.g. Christopoulos & Redmond, 2023). Peer observation can also be an important part of monitoring procedures in response-to-intervention models, where children at risk of language difficulties are first supported in their usual educational context in small groups, led by educational professionals who are coached and supervised by SLT clinicians, before being offered individualized SLT assessment and therapy (as proposed by Ebbels, McCartney, Slonims, Dockrell, & Norbury, 2019).

4.3 Intervention

In contrast to the traditional standardized assessment context, SLT clinicians usually take a more supportive role during intervention, because the relation between the clinician and the child, the therapeutic alliance (e.g. Sylvestre & Gobeil, 2020), has been shown to be very important for the child's motivation and interven-

tion progress. In fact, Kohnert et al. (2021) stress that outcome differences due to different clinicians are equal to, or even larger than, outcome differences due to different therapy methods. These therapy methods vary widely (described by Kohnert et al., 2021, as an “eclectic” mix), although they often include some amount of rather abstract, repetitive prompting and imitation tasks. Even if proposed in a child-friendly game format, these tasks do not seem very ecological and do not arise from clear communicative needs. This may contribute to the fact that children often struggle to stabilize and generalize what they learn in the SLT clinic and to use their new skills in real life (e.g. Schelstraete et al., 2010), as mentioned above.

Like for assessment, new avenues have been proposed recently to improve intervention along different axes. As mentioned above, conversational recasting during play is an interesting, more implicit alternative to more formal activities, but may not be effective for all children (Ebbels, 2014). According to Rodi (2018), it is important to pay attention to the full conversational exchange around recasts, in particular a ratification of the clinician’s reformulation on the child’s side, which the author sees as an essential part of “potentially acquisitional sequences” and a pre-requisite to uptake. Furthermore, narrative-based intervention (e.g. Petersen & Spencer, 2014) has been proposed as an implicit and ecological activity during intervention and shows good results on the macrostructural level, but does not seem focused enough to improve specific aspects of microstructure. Thus, certain more explicit, formal training activities may be necessary, which could be part of the explicit explanation bubbles punctuating more ecological, narrative or play-based, and possibly child-led activities, as described above (see Eisenberg, 2013). Furthermore, group therapy can also be beneficial for generalization and transfer because it offers more authentic communication opportunities and more autonomy than individual sessions, whilst not being less effective (Boyle, McCartney, O’Hare, & Forbes, 2009). Recent work suggests that working with peers with TD as age-appropriate interactional models is an interesting option as well, especially in case of bilingual children where the clinician does not speak one of the languages (Kohnert et al., 2021).

Finally, indirect therapy models, which rely partially or completely on the environment, are becoming increasingly popular, with SLT clinicians often only providing coaching to parents (or educators) without direct contact to the child. This can be as efficient as direct therapy in certain cases, and increase parents’ satisfaction and perception of self-competence (Roberts & Kaiser, 2011). However, children with receptive difficulties seem to benefit more from direct specialist intervention (Boyle et al., 2009), and the additional burden placed by indirect service delivery on often already vulnerable families (and on over-solicited education professionals) should not be underestimated. Thus, the extent and nature of

the involvement of the environment should be carefully negotiated and adapted to the specific situation (Berney, 2018; Watts-Pappas & McLeod, 2009), ensuring that activities are ecological and compatible with the child's daily life, as well as culturally appropriate. Again, including peers, siblings, and other relatives into these reflections does not only help with the organization of the activities, but also offers more authentic communication situations, especially in larger families from diverse socio-cultural backgrounds (e.g. Alam et al., 2022; Coffey et al., 2024; Sperry et al., 2019). Furthermore, relying on larger networks may not only alleviate the workload of the primary caregivers and educators, but also increase the variety of communication situations and subjects in which the child can develop and practice their language skills (see for instance Owen Van Horne, Curran, Cook, Cole, & McGregor, 2023, who successfully embedded a complex syntax intervention for preschool children in the science teaching curriculum).

4.4 Prevention

Even if it is important not to construe the social-interactional environment as a sole cause of language disorders, it is an important lever to work on in at-risk situations to increase the main protective factor, that is, quantity and quality of communicative interactions with the child (e.g. Paze et al., 2021). The aforementioned programs for parents (Roberts & Kaiser, 2011) and early childhood practitioners (Kern & Fekete, 2019) all aim at developing awareness of the importance of rich communication during daily activities, and at reinforcing scaffolding procedures, such as modeling, reformulation, and expansion, from the first years of life. Although they vary along different dimensions, for instance structure and directivity, the vast majority of programs has been shown to be effective in increasing children's language (especially vocabulary) and parents/practitioners' sense of competence alike (Roberts & Kaiser, 2011). Thus, it seems possible – and necessary – to adapt prevention programs to the important socio-cultural differences in child-adult interactions, such as the expected degree of directiveness with children and the value of talk and status present across and within countries (Kohnert et al., 2021; Skoruppa, 2025). In order to prevent language imbalances and, ultimately, attrition in multilingual children, it is beneficial to offer communicative support for all languages (see review by Durán, Hartzheim, Lund, Simonsmeier, & Kohlmeier, 2016). From a socio-interactional perspective, it is important to build up a network of interaction partners in all languages, ideally beyond the immediate family, including peers (friends) and monolingual speakers (e.g. grandparents) of a language (De Houwer, 2009). Furthermore, print exposure, such as pre-literacy activities, and later support with learning written language are crucial to open up to the larger linguistic and cultural community of

one's language(s); this is particularly important for bilingual children's trajectories across childhood and adolescence (Paradis, 2023).

In this context, digital media must be considered in a differentiated way. While it is true that, especially for young children, exposure to language in social interaction offers a better learning context than passive media exposure (see review by Lytle, Garcia-Sierra, & Kuhl, 2018), preschoolers can learn additional vocabulary items from cartoons (e.g. Van Horn & Kan, 2015) and benefit from interactive digital storybook activities (e.g. Courage, Frizzell, Walsh, & Smith, 2021). In the case of multilingual children, families often use digital media to reinforce weaker languages via cartoons or videocalls with physically distant relatives. While the quality of such media is variable in comparison to child-directed speech and books, and the precise effects of additional digital input remain to be investigated (Kolak, Monaghan, & Taylor, 2023), it is already becoming apparent that, again, not only the amount of screen time, but also the type and interactivity is important to consider. Moreover, parents and educators need to be coached in choosing alternative, enjoyable activities adapted to the child's interest, such as shared reading, games, role play, and excursions (see ideas in Bergeron-Gaudin, 2014, and Scharff-Rethfeldt, 2023), but also increasing dialogic conversation during routine activities such as mealtime, bathtime, and nighttime (Paze et al., 2021).

5. Conclusion and perspectives

I will begin this final section by bringing together the three contextual aspects that we have discussed separately so far, to summarize their importance for the four areas of SLT defined above, and to link them to UB and emergentist principles.

I have already alluded to the fact that after decades of research into 'the underlying cause' of DLD, it is now being increasingly recognized that causal relations are, and will remain, complex and multifactorial (e.g. Bishop et al., 2017). Instead of trying to determine one single cause for the whole heterogeneous DLD population, large-scale meta-analyses rather confirm the existence of probabilistic risk factors for the disorder that are both genetic and environmental (e.g. Rudolph, 2017). Indeed, researchers highlight the need to model causality all the way through – across the different dimensions of (genetic) etiology, neurobiology, cognition, and behavior, in constant interaction with the environment – in order to explain neurodevelopmental disorders (e.g. Bishop & Snowling, 2004).

As we have seen above (for example, in Evans, 2001), the UB approach offers an ideal theoretical framework to explain how DLD may arise from insufficient cognitive learning mechanisms (cf. Section 2) that lead to difficulties in coping with communicative demands in an age-appropriate way. These difficulties are

modulated by the specific forms of linguistic input (cf. Section 3) and social interactions (cf. Section 4) a child is exposed to in a non-deterministic fashion, that is, without having to postulate one single cause for the disorder across or even within individuals.

This lack of a clear, single underlying cause may be epistemologically and diagnostically unsatisfying. However, it forces clinicians to focus instead on individual children's profiles of strengths and weaknesses across linguistic domains (Bishop et al., 2017) and on adequate individual support strategies and solutions instead, and it may also help children with DLD and their families to overcome feelings of guilt and culpability.

Dynamic assessment (e.g. Orellana et al., 2019) can further contribute to shift the attention from diagnostics to intervention, considering these two phases as a continuum rather than distinct. Such dynamic procedures seem more in line with UB principles than more traditional, static test batteries, since these procedures directly evaluate children's learning mechanisms and strategies (cf. Section 2) for carefully controlled input sequences (cf. Section 3), whilst providing feedback in interaction (cf. Section 4).

Including the child as an "active user and processor" (Poll, 2011, p. 6) during all stages of the SLT process through choice and meta-reflection resonates with research on therapeutic engagement (Crenshaw, 2008) and fits well within a contemporary bioecological framework (Bronfenbrenner & Morris, 2007), in which the role of the SLT is no longer to "fix the holes" in a child's language knowledge, but to support the child in finding strategies to discover and make sense of new linguistic information they need to express themselves and understand others.

With respect to intervention and prevention, some attempts have been made to clarify what input children with DLD should receive to alleviate their language learning difficulties in terms of frequency, variability, and acquisition sequence (for example, Leonard & Deevey, 2017; Riches, 2013). However, recent UB research on typical language development has yielded a much more detailed picture of possible acquisition trajectories and highlighted other factors, such as semantic accessibility, prototypicality, and the organization in variation sets (for example, Behrens, 2021; cf. Slobin, 2026 this volume), which largely remain to be applied to clinical situations and to be incorporated in language assessments and intervention materials.

Yet, considerations of the socio-interactional context discourage overreliance on pre-prepared materials and overuse of therapist-chosen activities (for example, Coad et al., 2020). If the aim is not "to teach them some words", but "to help them find their words", it is imperative to look out for children's and their families' cues and to adapt to their life circumstances, especially (but not only) if they are from a different socio-cultural background than the clinician (for example, Wei

et al., 2005). For instance, clinicians can encourage children to bring along materials of their own (games, books, etc.) and adapt them for intervention, and/or directly co-construct materials together during therapy sessions. This may offer rich opportunities for informal discussions, meta-reflection and scaffolding, save preparation time and increase the (re-)use of the materials and activities at home. Although the resulting intervention might be less targeted and less well controlled with respect to psycholinguistic parameters, there is already evidence – though from aphasia intervention – that including “functionally relevant items”, chosen together with the patient and their family, can increase generalization and transfer effects (Renvall, Nickels, & Davidson, 2013).

In summary, UB and emergentist approaches offer an appealing theoretical framework to link clinicians’ long-standing practical experiences and intuitions about usage and context to contemporary psycholinguistic research. As such, they should be highlighted in SLT curricula in order to increase clinicians’ awareness of them (cf. Saldaña & Murphy, 2019). They also remain to be integrated in other areas of pediatric SLT than DLD, where they have been even less studied, but where the traditional, more individualistic and form-centered models of therapy seem even less applicable (see Abbeduto & Boudreau, 2004, for a first discussion of emergentist approaches on language in the case of intellectual disabilities). Furthermore, it will be exciting to monitor how clinical work done with children with language impairment within these frameworks feeds back to theories of typical first language acquisition, as they highlight the importance of individual cognitive and socio-cultural features to explain individual learning paths which are often underexplored in traditional corpus studies (for example, Behrens & Pfänder, 2022).

Finally, it is also of interest to establish bidirectional links with UB theories of second language acquisition research (for example, Ellis, 2015). For instance, inspiration may be drawn from adult L2 teaching for the interplay between implicit and explicit learning in (older) children with DLD, and vice versa. For example, some L2 researchers attempt to boost the acquisition of difficult aspects in a communicative language teaching framework by integrating specific form-focused strategies, which “attract learners’ attention to forms in the course of instruction that is not explicitly designed to teach them and thereby to cater to incidental acquisition” (Ellis, 2015, p. 1). This seems to somewhat mirror conversational modeling and recasting techniques as well as input enrichment (Kauschke, 2022). While L2 language teaching and L1 language therapy clearly concern different populations and have different objectives and priorities, it would be beneficial for these fields to engage in more dialogue about the successful learning methods and strategies (and their combinations) they have analyzed and developed independently in order to help struggling learners with mastering a con-

versational repertoire that is often claimed to be acquired largely effortlessly and implicitly during typical L1 acquisition. Finally, it would be interesting to go back and actively look for these methods and strategies in typical L1 acquisition corpora, as one would not be surprised to find that children, their peers, and their caregivers already heavily use them naturally in everyday communicative situations (for instance, during joint meta-linguistic reflections after communicative breakdowns).

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