

**SLI AND DEFICITS IN THE COMPUTATIONAL SYNTACTIC SYSTEM:
A COMMENT ON W. FRAWLEY'S "CONTROL AND
CROSS-DOMAIN MENTAL COMPUTATION: EVIDENCE FROM
LANGUAGE BREAKDOWN"**

HEATHER K. J. VAN DER LELY

Department of Human Communication Science, University College London

I welcome the opportunity to comment on Frawley's paper. Frawley puts forward the view that the organisation of the mental code for language can be characterised by the distinction between logic and control in algorithms, as put forward by computational programming. Further, his paper proposes that this distinction can accurately characterise different types of language disorders.

I will focus on two issues that are raised in Frawley's proposal: First, the claim that Specific Language Impairment [SLI] in children can be characterised by a deficit in "logic of mental computation"; in other words, the logic component of the mental algorithms for language. The second issue concerns the implications of this characterisation for the "innate" underpinnings of language, and the domain-specificity—a current highly controversial issue in cognitive science.

Frawley takes up my hypothesis (van der Lely 1994) that the grammatical problems in children with SLI are caused by a deficit in the syntactic component itself. First, this hypothesis departed from the majority, if not all, previous proposals of the cause of SLI. Based on the view that general-purpose mechanisms become specialised through experience during development (Elman et al. 1996; Karmiloff-Smith 1998), some researchers argue that SLI is caused through impairments in processing the input, and, or in limited cognitive processing capacity (Bishop 1997; Leonard 1998; Tallal and Piercy 1973). Thus, from this position, these researchers argue that no pure impairments of a specialised system can exist (Elman et al. 1996; Karmiloff-Smith 1998). Others (e.g., Chomsky 1986a; Fodor 1993; Pinker 1994, 1999), who claim that genetically determined specialised mechanisms underlie different cognitive abilities, anticipate the existence of pure primary impairments of specialised systems. Thus, the hypotheses falling into the "Grammar-specific deficit" view (Clahsen 1989; Gopnik and Crago 1991; Rice and Wexler 1996; van der Lely 1994) are based on this latter framework. Van der Lely's proposal initially differs from the "domain-general" view as the starting point for cognitive development, by contending that genetically determined mechanisms could uniquely subservise specialised cognitive functions such as grammar (van der Lely et al. 1998), and thus falls into the Grammar-specific deficit view of SLI. However, within this Grammar-specific deficit perspective, van der Lely's proposal further differs in fundamental ways from these other hypotheses. Hypotheses within this perspective can be divided into three areas: deficits with some or all morpho-syntactic features which are attached to lexical items prior to them entering the syntax proper (Clahsen 1989; Clahsen et al. 1997; Gopnik 1990; Rice and Wexler 1996), missing grammatical rules (Gopnik and Crago 1991), and a deficit in the syntactic representation itself (van der Lely 1994, 1998). If some or all morphosyntactic features are missing in the grammar of children with SLI, it would be predicted that they would not show control of, for example, Tense, Agreement, and Case features in their syntax. However, the data show that

Address correspondence to Professor Heather K. J. van der Lely at the Department of Human Communication Science, University College London, Chandler House, 2 Wakefield Street, London, WC1N 1PG, United Kingdom. E-mail: h.vanderlely@ucl.ac.uk.

they show considerable control of such features, as on a substantial number of occasions they use, for example, tense and agreement marking correctly. It is the inconsistency of tense and agreement marking that is abnormal in children with SLI. In sum, features affixed to lexical items per se can not be missing from their grammar. It is evident from the data from children with SLI that they can produce all grammatical forms (Bishop 1994)—it is just that they do not do so consistently. Thus, grammatical rules must also be available to them. Therefore, van der Lely's (1994) proposed that the deficit causing SLI is in the computational syntactic system, that is the syntax proper, and in this way contrasts with these other grammar-specific deficit hypotheses. Further, van der Lely's claims are primarily relevant to a subgroup of SLI children, that is those with primary grammatical deficits (G-SLI) who do not have other non-grammatical language or non-verbal deficits (van der Lely 1998; van der Lely, Rosen, and McClelland 1998). Thus, this proposal may not be generalisable to all children with SLI. However, the fact that other groups of children with co-occurring language or cognitive deficits, also evince similar grammatical deficits as the homogeneous G-SLI subgroup (Prentice and Conti-Ramsden 1988; O'Hara and Johnston 1997; Bishop et al. 2000), suggest that van der Lely's hypothesis can be generalised to a broader population of children with SLI than the G-SLI subgroup. Further comparisons between clearly defined homogeneous SLI subgroups from the heterogeneous SLI population are required to substantiate this claim are clearly warranted. Thus, although I am sympathetic to Frawley's proposal with respect to the underlying deficit causing SLI (as it concurs with my hypothesis!), it is unclear what his position is with respect to the heterogeneity of SLI, and his rationale for discounting alternative explanations of SLI both within the domain-general and domain-specific frameworks.

Recent developments of van der Lely's hypothesis are relevant to Frowley's proposal. First, van der Lely et al (1998) provides evidence for a relatively pure grammatical impairment in, at least, a subgroup of G-SLI subjects. This finding is consistent with genetically determined cognitive mechanisms that could subserve specialised cognitive functions such as grammar. Secondly, van der Lely (1994, 1996, 1998) points out that the grammatical deficit in G-SLI subjects is much broader than the inflectional morphological errors that are typically reported. I claim that the G-SLI is a broad ranging deficit at the core of syntax. Research since van der Lely 1994, has revealed, specifically, that G-SLI subjects inconsistently manipulate core aspects of syntax, including tense marking (*My dad go home*) assigning thematic roles in passive sentences and embedded phrases and clauses (*The man was eaten by the fish. The dog with the bone. . .*), and assigning reference to *him* or *himself* in sentences where syntactic knowledge is crucial for such assignment (e.g., *Mowgli says Baloo is ticking him/himself*) (van der Lely 1996; van der Lely and Hennessey 1999; van der Lely and Stollwerck 1997).

Based on the fact that correct and incorrect performance is found for the same lexical item in similar syntactic contexts, The "Representational Deficit for Dependent Relations" (RDDR) hypothesis claims that grammatical "rules" by definition obligatory, are optional in G-SLI grammar (van der Lely 1996, 1998). Furthermore, the RDDR account contends that the core deficit responsible for G-SLI grammar involves "Movement" (Chomsky 1995, 1998, 1999), and that whereas this basic operation/rule is obligatory in normal grammar, it is optional in G-SLI grammar (see van der Lely 1998 for further details). Thus, G-SLI grammar may be characterised by "optional Movement" (van der Lely 1998). Within the Minimalist perspective (Chomsky 1998) long distance dependencies necessitate Movement, where Movement is construed as attraction by a feature (e.g., Tense, Case) for the purpose of feature checking. In other words, a dependent structural (syntactic) relation is formed in a sentence for the purpose of linking and checking (matching, copying or moving) grammatical features associated with lexical items (or constituents). Thus, in more theory-

neutral terms, this syntactic dependency occurs when one sentential constituent “looks for” a “sister constituent” for feature checking/matching/copying for full interpretation. Although Chomsky (1995, 1998, 1999) defines this syntactic dependency operation as “Movement” the terminology to describe this operation may change with developing linguistic theories. However, it is the basic operation of syntactic dependency and the resulting grammatical operations/processes that is central to the RDDR account of G-SLI, and indeed central to syntax. In sum, consistent with Frawley’s proposal, the RDDR contends that the deficit is not in either the rules themselves, or features associated with lexical items, but in the computational syntactic system which makes the Movement rules obligatory (van der Lely 1998, 1999). Moreover, van der Lely claims that the deficit percolates through out aspects of the syntactic system that appear to be central to the human language faculty. The RDDR hypothesis can account for the range of syntactic deficits found in G-SLI and accurately predicts both weaknesses (question formation) (van der Lely and Battell 2001) and strengths (negative particles) (Davies and van der Lely 2000) in G-SLI grammar. However, it is unclear how Frawley’s characterisation goes beyond these data.

At present, we are far from understanding exactly how genes affect the development of neural pathways to result in an impaired grammatical system, or SLI in general. Moreover, the view one takes with respect to mechanisms versus representations and domain specificity, affects the inferences (or speculations!) one makes as to how genes cause SLI and the development of specialized cognitive systems. One suggestion put forward by Marcus (1999) is that by acting as switches, specific “master control genes” could trigger complex hierarchical cascades of genes that elicit widely varying arrangements of cells. Further, aspects of language could be under specific genetic control and a specific language impairment could reflect the absence of some gene that ordinarily triggers a cascade of events that leads to the construction of machinery that uniquely subserves grammar (Marcus 1999). In my colleagues’ and my papers, we only refer to specialized mechanisms or cognitive systems and do not consider the issue of mechanisms versus representations. We can speculate as to whether the deficit in the computational syntactic system is in a mechanism with a unique algorithm for grammatical processing, in the mechanism’s “attraction” to processing certain aspect of the input in certain ways, or in the capacity to form consistently particular structural representations given certain inputs. However, as yet, I know of no data that can make this distinction. Logically, if a mechanism is impaired then it will impinge on the representations that develop from or are served by this mechanism. This issue should be separated from the question of domain specificity and the identification of the genetic deficit(s) causing the various forms of SLI. It is not clear whether Frawley makes these distinctions in his paper or how they would impinge on the theoretical basis to his proposal, but it is certainly important to consider them.

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