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PLENARY SPEECH

Measuring children's metalinguistic awareness

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Abstract

Research into young learners' metalinguistic awareness has led to both definitions of the construct and key findings about its role in children's cognitive and linguistic development. I briefly summarise this research before introducing two established theoretical models that can help us understand the concept of metalinguistic awareness more broadly: Ellen Bialystok's classic dichotomy of analysis of knowledge and control of processing, and Rod Ellis's notion of explicit (second language) knowledge. This is followed by an overview of measures of metalinguistic awareness that have been used in empirical studies to date as well as an illustration and critique of selected measures. As a result, I propose a model that combines features of the two previous frameworks by conceptualising knowledge representations and processes in terms of (1) how implicit/explicit and (2) how specific/schematic they are. I explain this model to illustrate how it can serve as a useful thinking tool. In particular, I argue that the model not only allows us to theorise measures of metalinguistic awareness more clearly and easily, but that it can also capture tasks aimed at assessing other linguistic and cognitive abilities. The article concludes with a brief outlook on future research into metalinguistic awareness.

1. Introduction and overview

There is ample evidence in the research literature on additional or second language (L2) learning that metalinguistic awareness is associated with language learning achievement across the lifespan (for an overview of relevant research, see Roehr-Brackin, 2018). The present article focuses on metalinguistic awareness in young learners. Specifically, it provides an overview of how children's metalinguistic awareness has been conceptualised and measured in previous research, in preparation for an argument in favour of a model that can both usefully contribute to up-to-date theorising and inform the operationalisation of the construct of metalinguistic awareness as well as related constructs for the purpose of empirical work and teaching practice. To this end, the article is divided into five sections. I will begin with definitions of the key constructs under discussion, including metalinguistic awareness. Subsequently, I will describe two established theoretical models that allow us to position metalinguistic awareness in the context of second or additional language learning by individuals of different ages, that is, both children and adults. The models in question are, first, Ellen Bialystok's model of analysis of knowledge and control of processing, and second, Rod Ellis's model of explicit L2 knowledge. In the next part of the article, I will review selected measures of metalinguistic awareness that have been used in research to date. I have chosen a number of example operationalisations that I will illustrate and critique, bearing in mind the criteria that measures aimed at child learners need to meet.

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Following this overview of what we have in the field to date, I will present a theoretical model that characterises knowledge representations as well as the process of language learning and use on two bidirectional axes: implicit-explicit and specific-schematic. I will argue that the proposed model allows us to map concepts and tasks that are relevant in L2 learning and use and thereby serve as a helpful thinking tool for both researchers and practitioners (i.e. teachers); it is not intended to be a full-blown theory. How the model can be employed will be illustrated by means of several constructs, starting with metalinguistic awareness. I will end with a short forward-looking conclusion that considers how we may want to research children's metalinguistic awareness in future studies.

2. Construct definitions

Let us begin by defining the key constructs that feature in the subsequent argument. METALINGUISTIC KNOWLEDGE in the sense of knowledge about language is part of a learner's EXPLICIT KNOWLEDGE (Ellis, 2004). Explicit knowledge and learning often draw on a learner's METALINGUISTIC AWARENESS, in the sense of their awareness of the nature, function and form of language (Baker, 2006). METALINGUISTIC ABILITY refers to 'any objectification of language' (Birdsong, 1989, p. 1), and it is characterised by attention to language form rather than to linguistic content. Put slightly differently, it involves looking AT language rather than THROUGH it to the intended meaning (Cummins, 1987).

As the preceding definitions indicate, the terms metalinguistic knowledge, metalinguistic ability and metalinguistic awareness capture different shades of a common underlying concept (Bialystok, 2001). In an attempt to disentangle these shades of meaning, Bialystok (2001) argues that metalinguistic knowledge is knowledge about language that is broad and abstract; it includes knowledge of general principles applicable to more than one language, although this knowledge becomes accessible to the learner through knowledge of a particular language. An example of metalinguistic knowledge would be the knowledge that words in a language can be allocated to different classes, such as verbs, nouns or adjectives. Metalinguistic ability can be described as 'the capacity to use knowledge about language as opposed to the capacity to use language' (Bialystok, 2001, p. 124). It is related to but distinguishable from linguistic ability. An example of metalinguistic ability would be an individual's ability to categorise the English word *sofa* as a noun and the English word *sit* as a verb. Metalinguistic awareness 'implies that attention is actively focused on the domain of knowledge that describes the explicit properties of language' (Bialystok, 2001, p. 127). As attention is a general function implicated in all cognitive processes, metalinguistic awareness is also a part of general cognition.

These fine-grained definitions demonstrate that while the three notions can perhaps be distinguished at a theoretical level, they clearly share a common core – METALINGUISTIC – and distinguishing them in practice is a different matter, especially with regard to operationalisation for the purpose of empirical investigation. In other words, in order to capture evidence of metalinguistic knowledge, we devise tasks that can be solved if a learner draws on their metalinguistic ability, which, in turn, relies on their attention being suitably focused – that is, metalinguistic awareness. As a consequence of this theoretical interconnectedness and practical overlap, researchers often use the terms interchangeably, and I will follow the same approach.

Metalinguistic awareness as a higher-order skill is related to general cognitive development (Bialystok, 2001; Birdsong, 1989; Cummins, 1987). In other words, as children mature, their metalinguistic awareness gradually develops. Children who are exposed to formal schooling increasingly attend to and manipulate language forms as they grow older. Importantly, the construct of metalinguistic awareness has been and is being studied not only because it goes hand in hand with children's overall cognitive development, but also because it has been shown to be related to other factors, including literacy (Bialystok, 2001; Birdsong, 1989; Cummins, 1987; Gombert, 1992). Basic literacy skills, in the sense of being able to read and write, may be a prerequisite for the development of higher levels of metalinguistic knowledge, such as the ability to appreciate what counts as a word. Indeed, it has been shown that illiterate adults are often unable to treat language as an object accessible to reflection; instead, they tend to treat language as a means of communication only, similarly to pre-school

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children (Kurvers et al., 2006). Despite cognitive maturity, illiterate adults' metalinguistic awareness remains at low levels, such as the ability to identify rhymes, for instance.

Over and above literacy, bilingualism or multilingualism from birth appear to enhance metalinguistic ability at an early age (Bialystok, 2001; Jessner, 1999, 2006, 2014), although monolingual children eventually catch up in terms of metalinguistic development. Over and above early bi- or multilingualism, metalinguistic awareness has been shown to be associated with L2 achievement in instructed settings (e.g., Tellier & Roehr-Brackin, 2013, 2017). In fact, metalinguistic awareness is likely to both facilitate and be enhanced by L2 learning, so we are faced with a bidirectional or cyclical relationship. The partial overlap between metalinguistic awareness and language learning aptitude in terms of language-analytic ability in particular is a potential explanation for its predictive power. The classic conceptualisation of aptitude comprises three components: phonetic coding ability, memory and language-analytic ability (Skehan, 1998), with the latter referring to the ability to infer systematic patterns in language and make generalisations. Early research speculated about the relationship between language-analytic ability and metalinguistic awareness (Ranta, 2005; Sawyer & Ranta, 2001), and more recently, empirical evidence about the close association of aptitude and metalinguistic awareness in child learners has been presented (Roehr-Brackin & Tellier, 2019).

3. Theorising metalinguistic awareness: Established models

Now that we have defined the key constructs, let us look at two models that allow us to place metalinguistic awareness in a wider theoretical context. The first established model to be reviewed is Bialystok's model of analysis of knowledge and control of processing, which attempts to conceptualise children's general cognitive development, including language development (Bialystok, 1994a, 1994b, 2001; Bialystok & Martin, 2004; Bialystok & Ryan, 1985). Accordingly, it takes the first language (L1) as its starting point. By contrast, the second model to be reviewed, Ellis's conceptualisation of explicit L2 knowledge (Ellis, 2004, 2005, 2006), is based on the researcher's work with instructed adult learners and, accordingly, it takes the L2 as its starting point. The model regards metalinguistic awareness as part of an individual's explicit knowledge, which in turn can be contrasted with implicit knowledge. We will now consider each of the two models in a little more detail.

The notions at the core of Bialystok's model are analysis of knowledge and control of processing. With regard to analysis of knowledge, it is argued that as we develop, our knowledge representations become increasingly analysed, that is, more complex, more structured and more abstract. Implicit knowledge gradually becomes more explicit and thus more accessible to conscious awareness. This can be exemplified by means of increasingly sophisticated knowledge representations. For instance, drawing on Bialystok (1994a), we may start out with conceptual representations that are essentially meaning-based (e.g. 'dog' and 'bone' are associated). Subsequently, we additionally develop formal representations characterised by taxonomic relationships (e.g. 'dog' and 'cat' are associated by virtue of their shared superordinate category 'pet' or 'animal'). Finally, we also establish symbolic representations that are characterised by abstract word class (e.g. 'cat', 'dog' and 'bone' are associated by virtue of being nouns). All of these types of representation can exist alongside each other.

Control of processing refers to the mental procedures required for accessing our knowledge representations, that is, what current research would call executive function. As we develop, we get better at selectively allocating attention to the relevant aspects of a knowledge representation, inhibiting irrelevant information, monitoring and switching. This allows for more efficient processing across the board.

In an early depiction of the development of language abilities informed by the analysis/control framework (Bialystok & Ryan, 1985, p. 232), the researchers placed language skills on two intersecting bidirectional axes ranging from low-analysed to highly analysed knowledge on the one hand, and low to high control on the other hand. The skill of conversation (in L1) was placed in the lower left-hand quadrant, indicating relatively low requirements in terms of both analysis and control. Reading and writing were placed in the middle, suggesting medium requirements. Crucially, metalinguistic skills were placed in the top right-hand quadrant, indicating high requirements for both analysis of

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knowledge and control of processing. This is only logical, since highly analysed knowledge is characterised by structured, abstract representations, which allow us to retrieve details independently of context. In addition, high control facilitates an intentional focus on some types of information (e.g. form) at the exclusion of others (e.g. meaning). We thus have an instantiation of our definition of metalinguistic awareness.

In the second established model to be reviewed, Ellis (2004, p. 229) has defined explicit knowledge as:

> . . . the conscious awareness of what a language or languages in general consist of and/or of the roles that it plays in human life . . . Explicit knowledge is knowledge about language and about the uses to which language can be put.

He then further defines explicit L2 knowledge by listing its characteristics. In the following, I have selected those defining characteristics that I consider relatively uncontroversial, given the state of current research.

Accordingly, it is argued that explicit L2 knowledge can be regarded as knowledge that can be brought into conscious awareness. A distinction is made between intuitive awareness (e.g., recognising that a sentence is ungrammatical) and conscious awareness (e.g., cognising why a sentence is ungrammatical). Explicit knowledge is declarative, since it includes knowledge of facts about language (e.g., that there are verbs and nouns). A learner's explicit knowledge is potentially imprecise and/or inaccurate, but it is also developing as proficiency increases. Explicit knowledge can grow in breadth as a learner accumulates more facts about language, and it can grow in depth as existing knowledge is refined and applied more consistently. Explicit knowledge is accessible through controlled processing; views as to whether it can be automatised differ – something I will not explore here.

Explicit knowledge can be used to resolve difficulties, that is, it often functions as a support mechanism when learners solve language-related problems in comprehension or production. Explicit knowledge is knowledge that can be verbalised, memory and cognitive maturity permitting. Last but not least, explicit knowledge is learnable: anyone can acquire and use explicit knowledge to some extent, although individual differences play a role, such as the learner's age, general cognitive abilities and preferences, for instance (Ellis, 2004).

In conclusion, we can pinpoint an important contrast between the two established models: whereas Bialystok's framework of analysis and control assumes development from implicit to (more) explicit knowledge, Ellis's model is informed by a skill acquisition paradigm and, accordingly, assumes that development proceeds in the opposite direction, from explicit to implicit knowledge – that is, (instructed, adult) L2 learners essentially start out with the former and may or may not eventually develop the latter (for a recent take on the relationship between explicit and implicit knowledge in L2 learning, see Godfroid, 2023).

4. Measures of metalinguistic awareness: Examples and critique

Research to date has drawn on a wide range of measures when operationalising metalinguistic awareness. These measures can be divided broadly into qualitative and quantitative approaches. Qualitative measures typically employ verbal protocols that are subsequently analysed for evidence of metalinguistic awareness; for example, think-aloud protocols, stimulated recall protocols, dictogloss formats or interviews. This type of measure will not be discussed any further in this article. Instead, the focus will be on quantitative measures. These can be subdivided into (1) theoretically derived tasks based on the analysis/control model, (2) executive function tasks based on more recent conceptualisations of (executive) control as a component of working memory, (3) theoretically derived tasks based on the concept of explicit L2 knowledge, and (4) what I will refer to as empirically derived tasks that cover multiple linguistic domains and to some extent – though often indirectly – draw on both the analysis/control model and the concept of explicit L2 knowledge.

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In the first category, we have tasks intended to draw specifically on analysis of knowledge. These tasks typically require the detection, extraction or articulation of linguistic properties or structures (e.g., Bialystok, 1988; Bialystok et al., 2014; Hakes, 1980). Examples are error correction, providing definitions of concepts (e.g. What is a word?), judgement of concepts (e.g. Is X a word?), recognition of ambiguity, acceptability judgements focused on the grammaticality of sentences, and verbal fluency in the category condition (e.g. Name as many animals as you can within 1 minute).

The first category also includes tasks intended to specifically tap control of processing. These tasks typically involve misleading cues and require a focus away from meaning. Put differently, successful task resolution depends on the appropriate selection and integration of information (e.g., Bialystok, 1988; Bialystok et al., 2014; Piaget, 1929). A classic example is the sun/moon problem that plays on the arbitrariness of language and requires word-referent differentiation. In this task, a child is asked whether it would be possible to refer to the sun as the moon, and to the moon as the sun. If the child agrees that this is possible in principle, the researcher proposes to play a game in which this possibility is enacted – that is, they will call the sun 'moon', and they will call the moon 'sun'. Once this premise is established, they ask the child the name of the object they see in the sky at night when they go to bed, and the name of the object they see in the sky in the morning when they wake up. If the child answers with the labels duly switched in accordance with the premise of the game, they are deemed to exhibit word-referent differentiation. Other examples are tasks requiring the repetition of deviant sentences, acceptability judgements focused on semantic felicity, and verbal fluency in the letter condition (e.g. Name as many words starting with the letter B as you can within 1 minute).

A concrete illustration of the type of task from the first category can be found in an early study (Bialystok, 1988) where the researcher presented children with acceptability judgements in four different conditions, crossing ungrammaticality and semantic anomaly. Sentences could be both grammatically and semantically acceptable (e.g. Apples grow on trees; Why is the dog barking so loudly?) or both grammatically and semantically unacceptable (e.g. Apples on noses grow; Why the cat is barking so loudly?). These essentially functioned as control conditions. One of the critical conditions comprised sentences that were grammatically incorrect but semantically felicitous (e.g. Apples on trees grow; Why the dog is barking so loudly?), which were intended to measure analysis of knowledge, based on the argument that high levels of analysis would be required to detect the ungrammaticality. The other critical condition comprised sentences that were grammatically correct but semantically anomalous (e.g. Apples grow on noses; Why is the cat barking so loudly?), which were intended to measure control of processing, based on the argument that a high level of control would be required to inhibit the influence of the semantic anomaly and allow for the sentences to be judged acceptable.

The question that arises is whether sentences in both critical conditions actually require high levels of both analysis and control in order to be judged appropriately. In other words, I would argue that, while theoretically neat, a differentiation in terms of analysis and control is not always obvious or possible in practice. If a focus on form (the operationalisation of analysis) is the natural consequence of a focus away from meaning (the operationalisation of control), then the two dimensions cannot be separated empirically.

The second category of quantitative measures to be discussed holds executive function tasks. These are tasks aimed at tapping selective attention, inhibition, monitoring and switching (e.g., Bialystok & Craik, 2010; Bialystok et al., 2012; Bialystok & Martin, 2004; Poarch & van Hell, 2012). Examples are Stroop tasks, Simon tasks, flanker tasks and the dimensional change card sort task, with the latter perhaps least known and therefore our choice for illustrative purposes.

A study by Bialystok and Martin (2004) employed a series of dimensional change card sort tasks that were presented as games to participating children, requiring them to sort cards first by one dimension and then to re-sort them by a different dimension. In the so-called colour-shape game, for example, the stimuli consisted of blue squares and red circles, and the sorting containers were a box marked with a blue circle and a box marked with a red square. The pre-switch sorting rule asked children to put all blue pictures in the box with the blue picture and all red pictures in the box with the red picture. This means that children needed to sort by colour, so a blue square

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would need to be placed in the box marked with a blue circle, for instance. After a number of trials, the so-called post-switch rule was introduced. It asked children to put squares in the box with the square and circles in the box with the circle. This means that now the blue square would need to be placed in the box marked with a red square. In other words, the new sorting rule required sorting by a different dimension – shape instead of colour – and it is performance in this post-switch phase that is of interest. Can children successfully switch to the new rule, attend to the newly relevant dimension, and inhibit the previously established and practised but now irrelevant dimension when sorting the stimuli?

While this is a convincing operationalisation of executive function, it is quite clear that the task is essentially non-linguistic, similar to (most) other executive function tasks. If we take Bialystok's model as our starting point, the use of executive function tasks can arguably be justified, given that they require high levels of control to be completed successfully, similar to other, more clearly metalinguistic tasks. Executive function tasks measure fundamental cognitive capacities that underlie higher-order cognitive and therefore also linguistic abilities, including metalinguistic ability, but they do not directly assess metalinguistic awareness, and they do not map onto the proposed model presented further on.

The third category of tasks we are going to look at is concerned with measuring explicit knowledge about the L2, and accordingly, these tasks typically require the application and/or articulation of such knowledge (e.g., Ellis, 2005, 2006; Rodríguez Silva & Roehr-Brackin, 2016; Roehr, 2008b). Examples are metalinguistic labelling, error correction, description and explanation (essentially the application of pedagogical grammar rules to sentences), and exemplification of pedagogical grammar rules (i.e. providing sentences that illustrate given pedagogical grammar rules).

The following two items illustrate an error correction, description and explanation task (from Ziętek & Roehr, 2011):

- Can you please be quiet? I *work*.
  Correction: ______________________________
  Explanation: ________________________________
- It's really cold in here. Could you close *a* door, please?
  Correction: ______________________________
  Explanation: ________________________________

The targeted error is often highlighted, as in the example items used here, since identification and also correction of an error do not necessarily require conscious awareness, but can be completed successfully on the basis of intuitive awareness alone. They are included in the task as logical steps on the way towards the response of interest, that is, the articulation of explicit knowledge about the L2 in terms of a description and/or explanation of the suggested correction.

Potential issues with this type of task and others like it immediately suggest themselves. Specifically, suitability for children is limited, given that younger children in particular are still developing their literacy skills, cannot necessarily verbalise their knowledge, and may lack the required metalinguistic terminology.

The fourth and final category that I have called empirically derived tasks comprises measures that have not been designed on the basis of a particular theoretical model. While acknowledging different theoretical conceptualisations, these measures are developed with a focus on what is expected to work in a particular context, such as a given educational setting with participants in a particular age range and with certain language combinations. These types of task also typically cover multiple linguistic domains.

Figure 1 shows an example from a test of metalinguistic awareness developed for 8- to 11-year-old English-speaking children (Tellier, 2013, 2015, shown with the author's permission; the full test is available from iris-database.org). The task requires children to study the form of the presented words and decide which singular and plural forms go together; this, in turn, requires a prior decision as to which words are in the singular and which words are in the plural. The languages from which the

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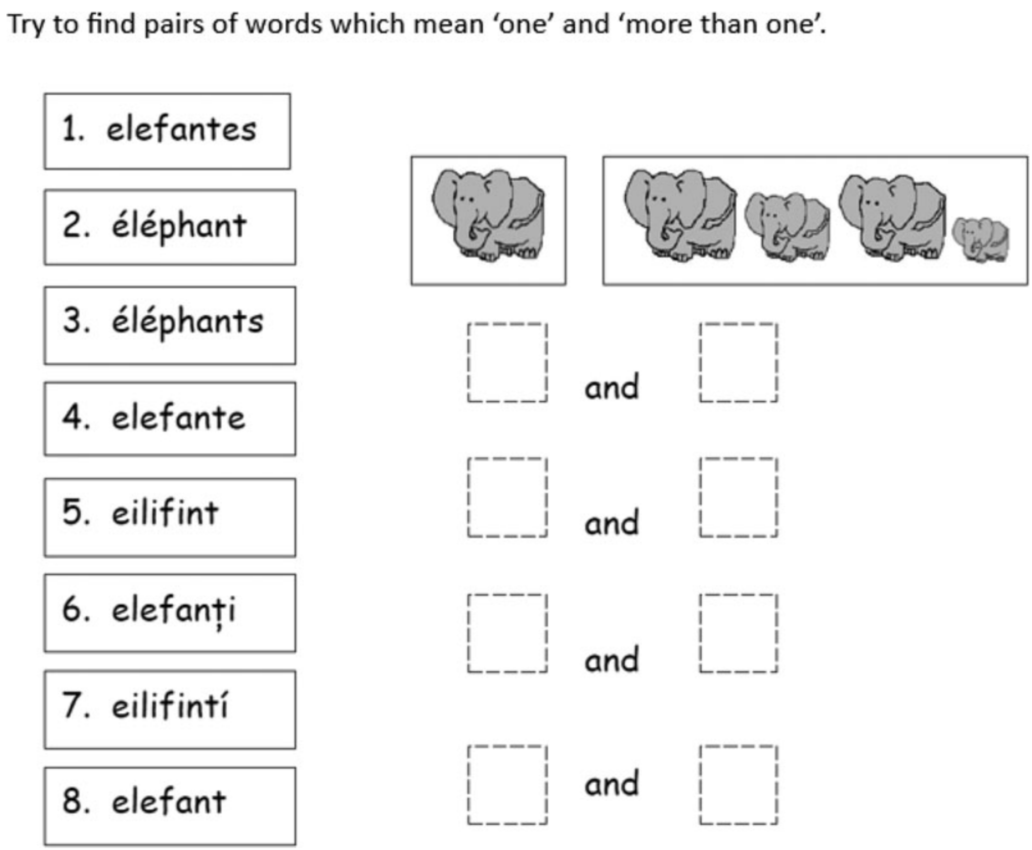

Figure 1. Task from Tellier (2013, 2015)

lexical items are taken do not need to be known to the children, since a focus on form – in this case, orthography, including diacritics – leads to the correct answer (4 and 1, 2 and 3, 5 and 7, 8 and 6).

Figure 2 shows an example from a test of metalinguistic awareness developed for the age range of 8 to 10 years in a Norwegian context (Carlsen et al., 2021, adapted from EVLANG and shown with the authors' permission). The task presents example sentences in the invented language Monsterspeak with Norwegian translations and asks children to translate the L1 sentence shown in bold into Monsterspeak. In order to solve the task, children need to study the vocabulary and word order of the example sentences in Monsterspeak and compare them against the L1 translations presented in the same line ('I have seen the lion', 'I have seen the fish', 'You have seen the fish') as well as the verbatim gloss in red font that highlights the differences in word order between Monsterspeak and Norwegian. The correct answer to the task sentence ('You have seen the lion') is 'Rin uni betiaki'.

The main advantage as well as the main disadvantage of tasks in this final category is their context-dependency. The tasks are age-appropriate and draw on the participants' L1, any L2(s) they are learning, L2(s) they do not (yet) know, including artificial mini-languages specifically developed for test purposes. Importantly, these tasks were designed and piloted with a particular sociocultural and educational context in mind. They have been shown to work well in that specific context, but they cannot easily be transferred to another context. If a researcher working in a different setting wanted to use the tests as they stand, they would be unable to do that; instead, they would have to design their own version. A further potential issue is the fact that empirically derived measures do not operationalise a specific model of metalinguistic awareness and could therefore be described as theoretically 'untidy'. However, this last point of criticism may no longer stand, as I will argue in the next section.

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In uni betiaki – Jeg har sett løven.

Jeg løven har sett.

In baka betiaki – Jeg har sett fisken.

Jeg fisken har sett.

Rin baka betiaki – Du har sett fisken.

Du fisken har sett.

Se godt på hvordan setningene i dette språket er bygd opp.

Prøv å oversette denne setningen til monsterspråk:

Du har sett løven: ______________________

Figure 2. Task from Carlsen et al. (2021)

5. A theoretical model of knowledge representations and learning processes: Mapping metalinguistic awareness

In Figure 3, a proposed model is displayed that allows us to map both theoretical concepts and actual tasks relevant to language learning, thus giving researchers and practitioners an overview of how different constructs and measures relate to each other, as well as where to expect overlap or complementarity. Such an overview will be helpful for selecting appropriate measures to be used in a given empirical context, as principled decisions can be made more readily by drawing on an easy-to-interpret visual display. Arguably, the model also demonstrates the theoretical merit of the seemingly intuitive design choices made in what I called empirically derived tasks in the final category of metalinguistic awareness tests reviewed previously.

As can be seen in Figure 3, the proposed model locates knowledge representations that are acquired during language learning and accessed during language use on two bidirectional axes. The horizontal axis captures the fact that representations and learning can be more or less implicit or explicit; the vertical axis indicates that representations and learning can be more or less specific (item-based) or schematic (abstract). In other words, an L2 learner may acquire and use concrete words or memorised chunks, and this can happen both explicitly (e.g., new vocabulary items) and implicitly (e.g., fixed formulae). At the same time, an L2 learner may acquire and use language implicitly, building competence bottom-up, or explicitly, working top-down by intentionally and deliberately studying textbooks or other instructional material. Various combinations are possible, although the importance and prevalence of each type of representation and each type of learning process will depend on both learning setting (e.g., instructed or not) and individual learner differences (e.g., age, general cognitive abilities, preferences).

For the purpose of empirical research as well as teaching, the model can be used to map tasks aimed at tapping language-related abilities. Of interest first and foremost, measures of metalinguistic awareness can be placed on the graph, as shown in Figure 4.

Figure 4 shows selected tasks that have been used in existing research to access learners' metalinguistic awareness. It is certainly possible to debate the precise position of each task in the display as

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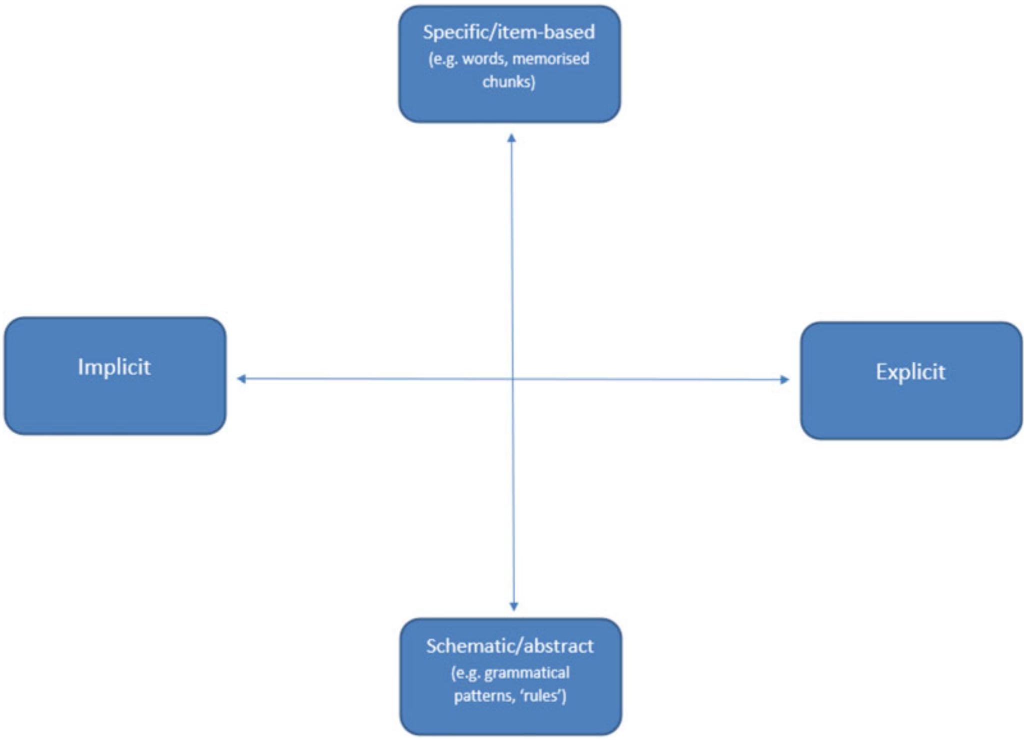

Figure 3. Theoretical conceptualisation of knowledge representations in language learning

well as in relation to other tasks. The visual display would lose some of its effectiveness if tasks were placed on top of each other, although we may wish to do this for a more accurate conceptual representation. Nevertheless, and arguably most importantly, the display allows us to see at a glance that all tasks are on the right-hand side of the graph, as indeed they should, if they operationalise the construct of metalinguistic awareness in the sense of explicit knowledge, ability and awareness, as defined in Section 2.

When employing tasks in the context of a specific empirical project that is aimed at obtaining as complete a picture of participants' metalinguistic awareness as possible, a researcher faced with a display such as the one shown in Figure 4 may decide to use four tasks, for instance: two from the top right-hand quadrant and two from the bottom right-hand quadrant. One of the tasks from each of the quadrants could be near the top of the vertical axis and one near the bottom. In such a set-up, it could be claimed that the construct of metalinguistic awareness was measured exhaustively.

Having said this, most current studies aim to measure more than one variable, and it is therefore expedient to consider how tasks tapping constructs that have been shown to be associated with metalinguistic awareness (see Section 2) can be captured by the proposed model. Figure 5 offers a display of tasks measuring language learning aptitude, Figure 6 shows tasks measuring L1 literacy, and Figure 7 displays tasks aimed at assessing L2 proficiency.

The display of tasks measuring language learning aptitude as shown in Figure 5 is deliberately selective, focusing on measures that are used in current research. Thus, the LLAMA aptitude test battery (Meara, 2005; Meara & Rogers, 2019) is featured, with LLAMA B measuring the ability to learn novel words, LLAMA E sound-symbol association, LLAMA F grammatical inferencing, and LLAMA D sound recognition ability. The absence of a study phase in LLAMA D as well as factor-analytic results have suggested that it may tap aptitude for implicit learning (Granena, 2013, 2020), hence its position on the left-hand side of the graph. The probabilistic serial reaction time (SRT) task

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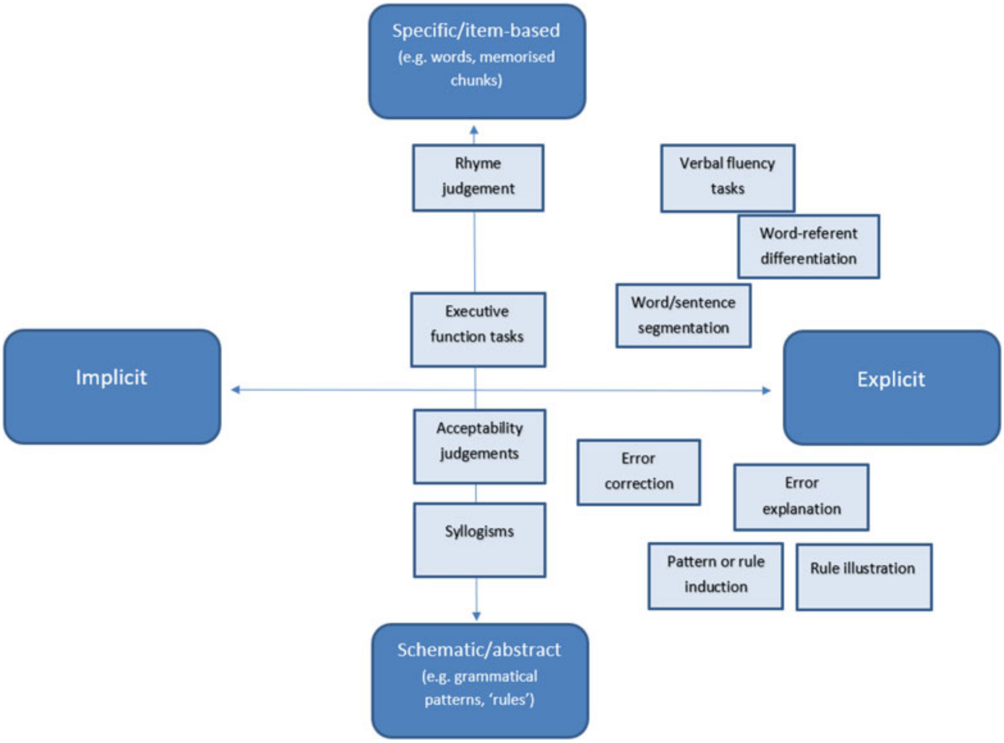

Figure 4. Tasks measuring metalinguistic awareness

(Kaufman et al., 2010) has been used as a measure of implicit aptitude, but unlike LLAMA D, it aims to assess individuals' abilities to implicitly learn (visual) sequences from the input that are based on an unknown complex probabilistic rule. Priming tasks have been proposed as another possible measure of implicit aptitude (Iizuka & DeKeyser, 2023; Suzuki & DeKeyser, 2017), although, to date, few studies in the field have used them for this purpose.

A final point worth noting is the fact that measures of working memory – both phonological short-term memory (PSTM) and executive working memory (Executive WM) – appear in Figure 5, while executive function tasks are also shown in Figure 4. This represents a point of overlap between the constructs of metalinguistic awareness and aptitude, over and above the more obvious overlap in the component of language-analytic ability, represented by tasks requiring learners to inductively arrive at a pattern or language rule, as exemplified by the metalinguistic awareness task shown in Figure 2 and captured by 'Pattern or rule induction' in Figure 4 and LLAMA F in Figure 5.

A point of note in relation to tasks measuring L1 literacy as shown in Figure 6 is that they are all located on the right-hand or explicit side of the model, thus mirroring the metalinguistic awareness tasks in Figure 4. This is as expected, given that learning to read and write is closely tied to metalinguistic development and given that both types of abilities draw on explicit knowledge and processes. Just like metalinguistic tasks, literacy-based tasks can be item-based, drawing on specific letters or words, or more schematic, requiring the comprehension or production of sentences or more extensive connected text at discourse level.

In view of the multitude of measures that have been used to assess (components of) L2 proficiency, I have mostly placed groups of tasks rather than individual tasks in Figure 7. Two points are worth noting. First, (groups of) tasks cover all four quadrants, as indeed they should if we want to capture L2 proficiency in its entirety. Proficiency in an additional language draws on both specific and schematic knowledge (Ellis, 2002a, 2002b, 2004), and it involves both implicit and explicit knowledge and

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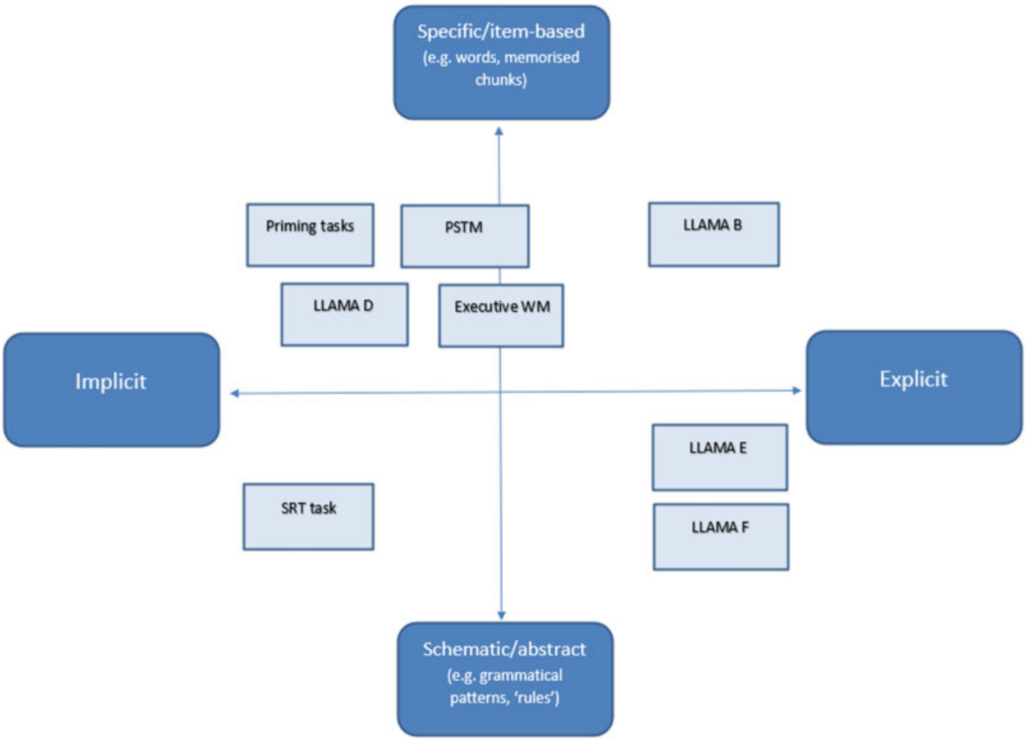

Figure 5. Tasks measuring language learning aptitude

processes (Ellis, 2006). Second, the current debate in the field on whether oral elicited imitation tasks measure implicit knowledge or automatised explicit knowledge (Suzuki, 2017; Suzuki & DeKeyser, 2015) is reflected in its placement at the centre of the figure.

Having illustrated four related concepts and their measurement – metalinguistic awareness, language learning aptitude, L1 literacy and L2 proficiency – it is now possible to take stock. In summary, the proposed theoretical model offers a number of advantages. We can place different types of linguistic and indeed non-linguistic tasks in relation to each other, thus capturing at a glance what these tasks measure in terms of knowledge (representations) as well as learning and use (processes). This allows us to identify and conceptualise points of difference and points of overlap between different constructs, including metalinguistic awareness, language learning aptitude, L1 literacy and L2 proficiency.

In this sense, the model can serve as a thinking tool that is useful for the planning and interpretation of empirical research and that can, to some extent, also inform teaching practice – for example, when preparing language practice activities or assessments. For instance, existing tasks as well as novel tasks a teacher has designed with their specific student body in mind can be placed on the graph in Figure 3 to judge the potential level of challenge they would pose, bearing in mind learners' ages and language learning experiences. Activities aimed at child learners can be made progressively more explicit and schematic, for instance, thus making them more challenging over the course of one or more school years.

Researchers can map measures onto Figure 3 in order to establish which dimensions of a given concept these tasks tap. They can then choose a selection of tasks that best capture the concept as a whole or particular dimensions they are most interested in, depending on the research questions they seek to address. In the case of measuring younger children's metalinguistic awareness, we may wish to choose tasks that are closer to the mid-point of the implicit-explicit axis and above all closer to the specific end of the specific-schematic axis, so awareness can be tested via concrete exemplars. Conversely, older children as well as adults will be able to cope with more schematic tasks, some of which require the use of metalanguage, for instance.

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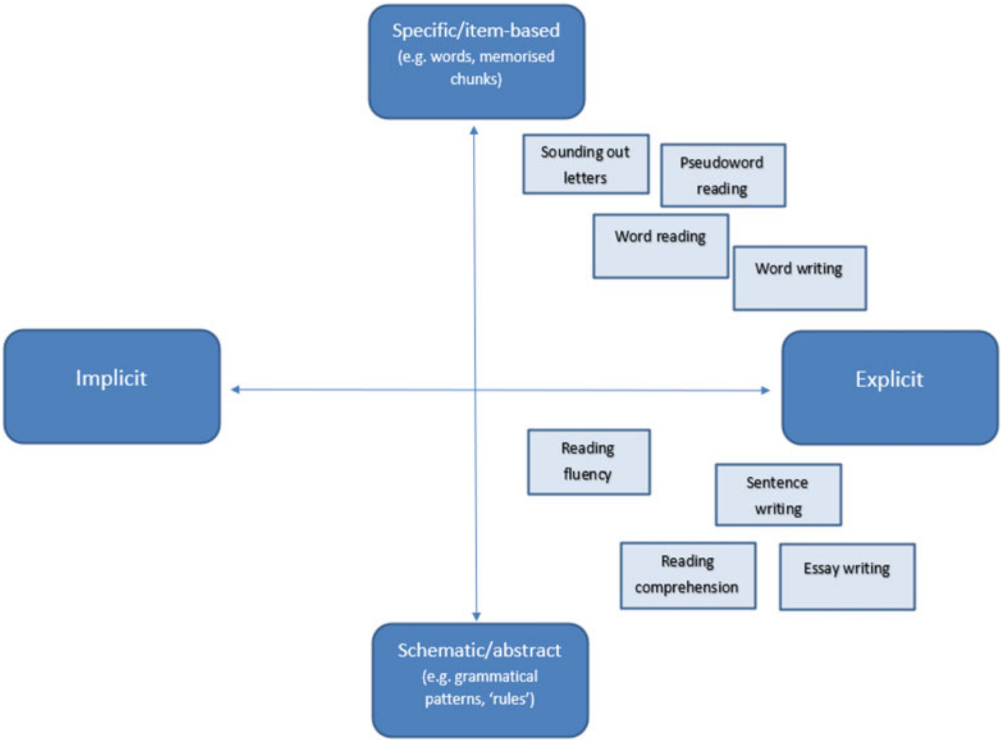

Figure 6. Tasks measuring L1 literacy

Over and above these practical advantages, there is theoretical significance too. The fact that the endpoints of the two axes of the model in Figure 3 are connected by bidirectional arrows is important. This feature is intended to emphasise that language development can proceed in either direction on both axes. With regard to the horizontal implicit-explicit axis, we can start with implicit knowledge or with explicit knowledge when learning an L2, in accordance with what recent and current research has demonstrated. The model assumes a relationship between the two types of knowledge without committing to what exactly this relationship looks like. A strict dichotomy is replaced with a sliding scale that can accommodate not only the classic distinction between implicit and explicit knowledge, but also more recently discussed constructs such as automatised explicit knowledge.

By the same token, the bidirectional vertical axis acknowledges the well-evidenced insight that we learn items and/or formulaic sequences that are later analysed (bottom-up), while we also learn abstract patterns or schemas into which we can slot specific items (top-down) (Roehr-Brackin, 2014, 2015). Again, an interface between the two is assumed, highlighting the fact that specificity and schematicity are endpoints on a sliding scale rather than dichotomous notions. The two concepts are distinguishable, but a strict categorical separation is difficult to maintain and arguably undesirable in any case.

It is important to note that the proposed model is not a full-blown theory. Equally importantly, the model is very much indebted to the established models reviewed in Section 3; in fact, it can be seen as a slightly extended combination of the key claims put forward by Bialystok and colleagues on the one hand and Ellis on the other hand, which seeks to coherently incorporate recent theorising. Essentially, the two axes I propose capture Bialystok's notion of analysis by separating abstractness and explicitness, which are conflated in the classic notion. Instead, Bialystok's notion of control is incorporated into the horizonal axis, in line with current theorising. It is in the nature of implicit knowledge representations that they can be accessed fast and automatically, whereas explicit knowledge representations are accessed by means of (more) effortful and controlled processes, as reflected in Ellis's approach.

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Figure 7. Tasks measuring L2 proficiency

Returning to the feature of bidirectionality, the model draws on the essentially unidirectional processes posited in the two classic models and combines them in light of current thinking. Bialystok assumed development from implicit to explicit knowledge, and from specific to schematic knowledge. Conversely, Ellis assumed that development would start with explicit, schematic knowledge. The model takes into account that although younger children are more likely to learn implicitly and bottom-up, whereas (instructed) adults are more likely to learn explicitly and top-down, this is by no means categorical. Children as young as 8 or 9 years CAN learn explicitly, and adults CAN learn implicitly. In other words, both directions can be taken by L2 learners across ages, as suggested by recent research.

6. Conclusion

Researchers may conclude that the best option would be to employ more than one measure for assessing each concept under investigation, including metalinguistic awareness, while at the same time pushing the boundaries by incorporating an innovative alternative. Indeed, this is the direction that I believe future research into children's metalinguistic awareness should take. An interesting recent study with an original approach to operationalising the construct (Spit et al., 2021) may serve to illustrate this point. Drawing on a picture-matching task to assess learning in the sense of L2 proficiency and a verbal protocol to assess verbalisable explicit knowledge, the researchers introduced a novel measure of metalinguistic awareness suitable for use with very young children.

Specifically, Spit et al. (2021) sought to measure access awareness in children aged between 4 and 6 years by means of a so-called opt-out paradigm, which allows participants to demonstrate awareness by expressing uncertainty through a non-verbal response. The researchers distinguish between access awareness, which is comparable to the notion of noticing, and phenomenal awareness, which implies

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verbalisable explicit knowledge (for a conceptualisation of different types of awareness or consciousness, see Cleeremans et al., 2020). They argue that most existing measures of awareness focus on phenomenal awareness, assuming that participants have a coherent experience of whatever they are aware of, can reflect on it and can articulate it. Conversely, in their study, the researchers want to measure access awareness in an indirect but objective manner (for a discussion of the challenges involved in measuring awareness or consciousness, see Timmermans & Cleeremans, 2015).

The participating children were exposed to sentences in an artificial language accompanied by pictures showing their meaning in order to facilitate (implicit) learning of the underlying regularities in the input. The artificial language comprised a less difficult (regular) and a more difficult (non-transparent) pattern. In an immediate post-test, children performed a picture-matching task, so sensitivity to the targeted patterns could be ascertained. This was followed by an opt-out phase to establish whether the children had also developed access awareness of the grammatical systematicities. Children heard the same items as in the picture-matching task, but without the (critical) last word. They were then able to select whether they wanted to (1) hear the full sentence and make a choice between two pictures, with the correct choice leading to a reward and the incorrect choice not resulting in a reward, or (2) opt out and simply move on to the next test item. The opt-out led to a smaller reward.

The researchers hypothesised that children who were more certain of their knowledge would select (1) in order to obtain the greater reward. In other words, access awareness of a regularity could be demonstrated without children having to produce or describe that regularity verbally. The findings provided evidence for the development of access awareness, with children opting out significantly more frequently on trials involving the more difficult target pattern. Children did not demonstrate higher levels of awareness, that is, phenomenal awareness as evidenced by the articulation of knowledge during a subsequent debriefing phase. Moreover, and perhaps unsurprisingly, considerable individual differences between children were found.

The study is not only innovative in its operationalisation of metalinguistic awareness via the opt-out paradigm, but its theoretical framework also sits well with the model I have proposed: the distinction between access and phenomenal awareness can be accommodated on the implicit-explicit axis, and the target feature can be located roughly in the middle of the specific-schematic axis, given that it is a morphological pattern (schematic) that has two instantiations (specific). This demonstrates not only the merit of the example study, but also the potential uses of the proposed model.

Nevertheless, it is expedient to consider the limitations of the proposed model as well. First, given the nature of the display, the model cannot easily capture more than two dimensions at a time, even though other dimensions beyond the implicit-explicit and specific-schematic scales are of potential interest. First, task modality (auditory or visual or both) may play a role when metalinguistic awareness, language learning aptitude or L2 proficiency are measured. Sensory modality is a categorical variable that cannot be conceptualised on a scale, although auditory and visual material can be presented both separately and in combination. Second, the nature of stimuli used in a task may be relevant when language learning aptitude, working memory and/or executive function are measured. Indeed, results from tasks using linguistic vs. non-linguistic stimuli may not be readily comparable.[1]

Therefore, it goes without saying that the proposed model is not intended to be the last word on the topic of conceptualising metalinguistic awareness or indeed the related concepts of language learning aptitude, L1 literacy and L2 proficiency. Paraphrasing Hulstijn (2019, p. 176), the proposed model is a heuristic tool, and if other researchers find it sufficiently challenging and interesting to try it, falsify it and/or to propose modifications, then this is to be welcomed. In this spirit, the reader is invited to critique and amend, to suggest additions and alterations. Refined theoretical conceptualisations and

[1]A reviewer suggested that a separate axis may be required to capture different linguistic domains. However, this is not necessary if a usage-based theoretical framework is adopted, since the specific-schematic axis is sufficient to account for all linguistic constructions in the sense of form-meaning mappings, regardless of whether they are phonological, lexical, morphological or syntactic in nature (see, e.g., Barlow & Kemmer, 2000; Goldberg, 2003; Roehr, 2008a).

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improved measurement go hand in hand, so an improved model can hopefully help with arriving at better measures.

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