[**MANUSCRIPT SUBMITTED FOR PUBLICATION**]

Lexical paths

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Abstract

I propose that we retire the term *lexical item* from psycholinguistics and replace many of its uses with *lexical path*. The term *lexical item* is currently used in many different ways by different researchers, causing ambiguity about research questions, claims, and theories. I explain why the change from *item* to *path* will naturally encourage authors to clarify their assumptions. The *path* metaphor helps to eliminate confusions and apparent paradoxes that arise in discussions of anomia, language acquisition, and morphological decomposition when lexical knowledge is characterized as a set of *items*.

1. Throwing up

When I teach about the problem with the term *lexical item*, I like to start with the case of the phrase *throwing up* in English. We could conceive of a child whose parents always used the expression *vomit* to express the concept {vomit}. Naturally, these parents would still use the expression *throw* to express the {throw} concept and *up* to express the spatial concept {up}. In such an environment, we might expect the child to acquire a lexicon containing a fragment like that depicted in Figure 1. Using traditional terminology, we would say that this fragment of the lexicon contains 3 lexical items.

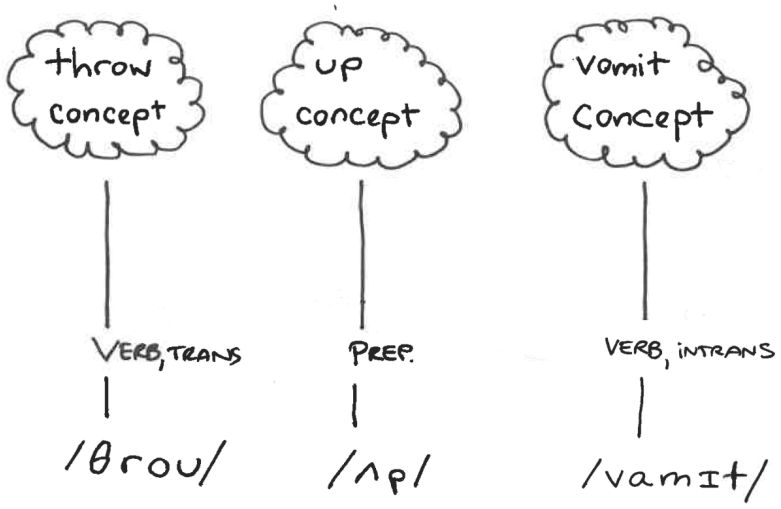

Figure 1. A diagram of the child's lexical knowledge prior to acquiring the expression *throw up*.

Now we can imagine that the child goes off to school, and after some exposure to the other children, she learns that the expression *throwing up* can also be used to express the concept {vomit}. Obviously her lexical knowledge has changed, but how do we describe this change? From the *item* perspective, it looks like we have all the same items that we had before. We have the same inventory of concepts. We have the same set of syntactic feature complexes, and the same set of phonological forms, and even the same set of mappings between syntactic complexes and phonological forms (the past tense of *throw up* is *threw up*, just as the past tense of *throw* is *threw*). What seems to have changed is that the child has added additional mappings between existing elements (Figure 2). She's learned that if you want to express a thought about someone vomiting, not only can you do this with the *vomit* expression, but you can also do that by making a syntactic phrase with the *threw* and *up* elements. Describing this knowledge as adding an *item* seems awkward and unnatural. If we want a convenient terminology to objectify this kind of new knowledge, it's a better fit to say that she's learned a new lexical *path*.

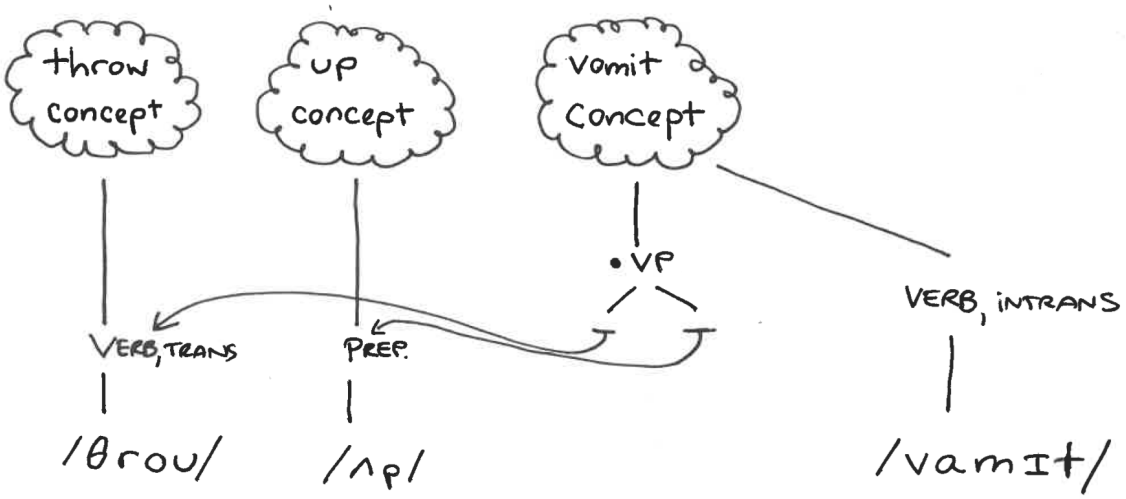

Figure 2. A diagram of the child's lexical knowledge following acquisition of the expression *throw up*.

2. On items

Acquiring a lexicon means acquiring a set of mappings. We've just seen an example of how the item metaphor is often not a good fit for mappings. Items are discrete and individuable. We can count them, and say where one starts and the other ends. In the material world we can pick up an item, we can destroy an item, we can add an additional item to a collection that we're maintaining. Items can be complex, but what makes them characterizable as items is that there is a set of actions and operations which occur with respect to the item as a whole.

It is possible to treat mappings, or relations between elements, as objects in their own right—we could count the number of possible mappings specified from a range to a domain, we can add or eliminate a mapping, we can give identity criteria for when a mapping counts as the same mapping. But while this is possible (and par for the course in abstract mathematics), treating relations as items is effortful and confusing for the average person. It is confusing because you can add or eliminate a mapping between elements without adding or eliminating the elements being related, and it is especially confusing when mappings are not systematically one-to-one.

If we draw a diagram like Figure 1, it looks like the mappings and the elements that they relate can actually be packaged together into nice, neat composite objects that we can pick up and carry around and count and rearrange as items. The *throw* object looks like it could comprise the concept {throw}, the syntactic feature complex [throw], the structured phonological form /θroʊ/ (plus the irregular tense context-dependent forms /θru/ and /θroʊn/), and the mappings that relate these conceptual, syntactic, and phonological elements. But cases like *throw up* show us that the unified, independent lexical object is an illusion: the syntax-to-phonology mapping from [throw] to /θroʊ/ (or /θru/ or /θroʊn/) can be used independently from the concept {throw}, when

participating in the fixed phrasal expression *throw up*. We can't pick up and carry around the illusory *throw* lexical object without carrying away some of the phonological mapping information that will be used for the conceptually independent *throwing up* expression. The same is true in cases of simple homophony, for example *foot* as a body part and as a unit of measurement, both of which share the irregular plural *feet*. The concept-to-syntax mappings are not one-to-one with the syntax-to-phonology mappings. This suggests that the item metaphor is indeed inappropriate for applying to the wide range of stored mappings that human languages make use of. We need a terminology that clearly distinguishes between stored objects (e.g. concepts like {throw} and phonological objects like /θroʊ/) vs. stored mappings *between* objects. Fixing the term *lexical path* for stored mappings would help achieve this.

The prevalence of homophony across human languages is itself somewhat surprising within the traditional lexical item metaphor. If phonological, syntactic, and semantic information is collected into uniform "bundles", the item metaphor would suggest that homophony involves the special step of making a "copy" of the phonology in one bundle so it can be added to another. In the same way, homophony has often been seen as posing a special challenge to acquisition and language comprehension. However, growing evidence indicates that most natural language homophones are relatively easy for children to acquire, in many cases no more costly than acquiring non-homophones (e.g. Storkel & Maekawa, 2005; Dautriche et al., 2018). In this work, it is suggested that one reason homophones are common in human language lexicons is that mapping multiple meanings to the same phonological wordform results in learners needing to encode fewer phonological wordforms in memory. Such a many-to-one mapping strategy can be more straightforwardly described in terms of lexical paths than lexical items; learning the second meaning of a homophone just means creating a new path from a different concept to an existing wordform, where creating a relation to an existing phonological structure is less costly than creating a new phonological structure altogether.

3. Linguistic and non-linguistic mental representations

Another reason the terminology *lexical item* is confusing is that while the *lexical* in *lexical item* marks it as a linguistic object, the mappings that compose a lexicon include mappings to and from non-linguistic elements: concepts. There is broad and growing consensus among cognitive science researchers that non-linguistic animals have categorical mental representations that participate in general knowledge and reasoning, and even metacognition, satisfying standard definitions of *concept* (see Fitch, 2020, for review). Therefore, to terminologically bundle together into a composite *lexical item* all the elements that are related to each other is confusing because not all the elements being related have the same reason for being. Concepts evolutionarily pre-date language, and acquiring linguistic knowledge in many cases means

acquiring a mapping from a pre-existing concept to linguistic representations[1]. To try to draw a line around the elements being related as well as the relations themselves can create confusion about this point, and the ways in which thought and language are independent.

In the highly influential Levelt, Roelofs and Meyer (1999) production model, the term *lexical concept* was introduced to try to skirt this issue: lexical concepts were just that subset of concepts which was mapped to syntactic elements, or *lemmas* ("concepts flagged by way of a verbal label", p. 1). This allowed Levelt et al. to limit the conceptual activation process in their model just to the set of lexical concepts, to assume that each lexical concept has one corresponding lemma, one-to-one (Roelofs 1992), and to draw simple diagrams with connections from lexical concepts to lemmas to phonological forms. But year after year I observe my psycholinguistics students being confused by this terminology: are *lexical concepts* linguistic representations or non-linguistic conceptual representations? Are the lexical concepts intrinsically different than the other concepts, acquired in a different way or stored in a different part of the brain? But how could that be without disrupting their original role in non-linguistic knowledge and reasoning?

The *lexical path* terminology eliminates this confusion. Concepts can be defined as non-linguistic components of thought, knowledge, and reasoning. For some concepts, a speaker has acquired a stored mapping from the concept to a language expression—a lexical path. For other concepts, no corresponding lexical path exists (so far). The path metaphor makes it easier to see that the presence or absence of a lexical path doesn't change the intrinsic properties of the concept, just like the intrinsic properties of a building don't change when you add a path to it. There's therefore no need to introduce a subcategory like *lexical concept*. Another useful aspect of the path metaphor is that we don't usually assume that paths connect like things—a path could lead from a desert to an ocean, or a basketball stadium. Positing a lexical path from a concept to a syntactic or phonological unit thus avoids any implication that the concept itself is part of the lexicon or the linguistic system (although theorists remain free to propose this if they wish; see, e.g. Vicente & Collins 2026).

4. Partial information access

The lexical path metaphor also does a better job than *lexical item* at capturing commonly observed cases of partial access to information. A longstanding observation whose theoretical importance Levelt and others have emphasized is that of *tip-of-the-tongue* phenomena in production, where a speaker can access some but not all lexical information. In tip-of-the-tongue states (or in sign languages, *tip-of-the-finger* states), the speaker feels confident that they know the appropriate linguistic expression to communicate their intention, but they cannot produce it or consciously access it. Sometimes speakers can partially access syntactic information, such as a

[1] Alongside many other cases in which a concept is acquired by means of its introduction through the modality of language.

noun's grammatical gender, or phonological information, such as the onset phoneme, the number of syllables or stress pattern, or morphosyntactic structure ("I know it's a compound"), without being able to recall the full wordform.

Partial access phenomena make the *lexical item* metaphor somewhat less of a good fit. One of the core diagnostics for objecthood in the material world is spatiotemporal contiguity: all of the components of the object move together. A laptop computer has lots of parts, but when you pick it up and carry it, all those parts move together as a package. When you store your laptop in a drawer, all the parts of the laptop are stored together, in the same location (well, in adjacent positions in space within that drawer). We could conceive that if part of the computer broke off, it would no longer reside in the same location as the other part, such that you might be able to access one part and not the other, and that might work as a metaphor for permanent forms of anomia (name-finding difficulty) in cases of brain damage. But most tip-of-the-tongue states are sporadic and impermanent, and are immediately resolved when the speaker is reminded of the name or given a hint.

The *lexical path* metaphor brings to the forefront the challenges of maintaining and accessing relations between information in different locations, in a way that closely parallels tip-of-the-tongue phenomena. In navigating the world, people are constantly forgetting the spatial relationship between two places and getting lost. They maintain their memory of the two places, but because they have lost access to the spatial relation between them, they can no longer get from one to the other. That means that if you could teleport such a person to their desired goal, they could look around them, recognize the place, and say "Yes, this is where I was trying to get to". In other cases, people make it partway down the path but get lost before they get to the end. And on a multi-stop shopping trip, we might pick up some of the things on the list but run out of gas before we get to the end of our route.

Levelt and colleagues (Levelt, 1989; Levelt et al. 1999) took tip-of-the-tongue phenomena to support a one-to-one lexical model in which the syntactic lemma unit is more tightly related to the lexical concept than to the morpheme or phonological wordform and mediates between them. In support of this, they emphasized the observed cases in which healthy speakers or patients could retrieve grammatical gender information but not phonological information. However, Caramazza (1997) famously critiqued this argument, pointing out that other cases of partial information access did not fit the tidy pattern predicted by this view. Caramazza and Miozzo (1997) found that participants in tip-of-the-tongue states could often retrieve phonological as well as syntactic information, and crucially, that retrieval of phonological information was uncorrelated with successful retrieval of syntactic information. Caramazza also pointed to cases of people with aphasia who make grammatical gender errors in production while correctly producing the phonological wordform (Miceli & Caramazza, 1988), as well as dissociations in the ability to access lexical syntactic information in spoken vs. written contexts.

The *lexical path* terminology is helpful because it easily accommodates these well-established partial information access phenomena, without presupposing commitment to one-to-one lexical mappings or a particular sequence of access stages. For the item metaphor, in which all of the elements and mappings between them are conceived as a unified bundle, the occasional inability to access all of the bundle comes as a surprise which needs some ingenuity to explain. For the path metaphor, the occasional inability to get from point A to point B and point C is fully in line with standard physical and informational transport problems, and the interesting questions are just about what are the factors that cause transport difficulties and why.

5. What is lexical access?

For similar reasons, the lexical path terminology avoids confusion and ambiguity within the psycholinguistics literature in regards to what is meant by *lexical access*. The tip-of-the-tongue phenomena discussed above clearly illustrates that the information within a traditional lexical item (meaning, syntax, phonology) can sometimes be only partially accessed in production. The same is intuitively true in comprehension: we can recognize a phonological form as familiar without knowing what it means, and/or without knowing its full set of syntactic properties.

If a lexical item acted like a material object, in that the lexical information were all bundled together and accessed on an all-or-none basis, then there would be no ambiguity about what was meant by *lexical access*: metaphorically, it would be equivalent to picking up the object. But if some parts of a lexical item can be accessed without others—like being able to pick up the handlebar of a bicycle without its frame or wheels—then the definition of *lexical access* is no longer obvious, and we have to define the term explicitly if we are to use it.

Unfortunately it is common for psycholinguistic researchers to use this term without definition, and to use it in different ways. For example, Fink et al. (2018) define lexical access as "the retrieval of lexical and phonological information from memory"—the phrasing suggesting that phonological information is not strictly "lexical", but its access is. This partially follows a usage of *lexical item* common in linguistics which refers to the syntactic representation only, but the authors seem to extend the meaning of *lexical access* to include information other than the lexical item so defined. Other authors simply say that lexical access is the process of accessing representations of "words" (e.g. Isacoff & Stromswold, 2014; Hintz et al., 2020; Smith & McMurray, 2022) where this seems to include form information as well. Roos et al. (2023) distinguish "lexical" from conceptual and phonological information, but suggest that all three kinds of information are retrieved "from the mental lexicon", in a process they call *word retrieval*[2]. Perfetti and colleagues describe "high-quality" lexical representations as those which

[2] Similarly, in her encyclopedia article on lexical access Anne Cutler (2002) thoughtfully notes that *lexical representation* really can't be equivalent to *word* given the existence of fixed phrases, idioms, and affixes, but then goes on "Nevertheless, in this text *words* will serve as shorthand for *lexical representations*."

have links between orthographic, phonological, and semantic+syntactic constituents, and "low-quality" lexical representations as those which do not (e.g. Perfetti & Hart, 2001). Each of these might be a reasonable terminological approach; the problem is just that their uses of *lexical* are not fully consistent with each other. This causes real ambiguity in the much wider group of papers that do not define the term at all (and I note that much of my own earlier work falls into this category).

Authors also differ on whether *lexical access* refers to directionally-distinct processes or not. For example, Cutler (2002) describes lexical access in comprehension and production as two distinct processes ("Lexical access in speaking is the process of finding the lexical representations to express the desired meaning. Lexical access in understanding is the process of finding the lexical representations which correspond to the heard sounds. It is a matter of dispute whether there is a unitary mental lexicon that is drawn upon both in speaking and understanding."), while Momma and Phillips (2018) take it to be uncontroversially the same mechanism in both ("the mechanism is identical in parsing and generation").

Replacing *lexical item* with *lexical path* doesn't solve the problem of agreeing on a standardized definition for lexical access. But it does draw more attention to that problem, and it prevents non-solutions like defining lexical access as "accessing a lexical item". Since paths lead to and from somewhere, lexical path terminology makes it clearer that we need to say what *kind* of information is the output of an access operation, and ideally, also what is the form of the *input* that this access operation takes.

6. Morphology

Morphology is a confusing level of linguistic representation. Many people share intuitions about some words being "morphologically complex" (e.g. *internationally*) and others not (e.g. *ham*). What this means about the architecture of the cognitive system for human language, has been more difficult to work out. In psycholinguistics, this has led to major debates, spanning decades, about how morphological complexity impacts comprehension processes.

Morphology is typically defined as the study of word structure, or word formation. Frustratingly though, a technical definition of the colloquial term on which this definition depends, *word*, is rarely provided. This is probably because, as Haspelmath (2011) argues, there exist no simple criteria for wordhood that apply equally across different human languages and account for the ways in which the term typically gets used in linguistics and psycholinguistics[3]. Without a definition of *word*, we're left without a definition of *morphology*, or *morphological complexity*. A morphologically complex word is supposed to be a word that contains more than one

[3] The best definition Haspelmath himself is able to come up with to accommodate common usage (Haspelmath, 2023), is a set of disjunctions: "A word is (i) a free morph, or (ii) a clitic, or (iii) a root or a compound possibly augmented by nonrequired affixes and augmented by required affixes if there are any."

morpheme—but how do we determine where the word boundaries are? We might follow a traditional approach of using the white spaces in text as word boundary indicators. But natural human language is written, not spoken; variation in the presence of white spaces in text can look arbitrary (e.g. *ice cream* vs. *cornbread*); and many writing systems don't use spacing at all.

What a morpheme is, is also not straightforward (see Cuonzo, 2025, for extensive review). A traditional definition of a morpheme is, "the smallest unit of form with a meaning"[4]. On this definition, *morpheme* names a phonological unit, one that has a mapping to meaning. However, there are long known challenges in individuating *morphemes* this way, which raise questions about whether these criteria indeed define a natural unit of cognition. Individuating morphemes by phonology is complicated by the common phenomenon of *allomorphy*, in which a meaning is expressed with a different form in different contexts. Usually if the different forms are somehow "similar", they are considered to be the same morpheme (e.g. plural /s/ vs. /z/ in English), but the criteria for similarity is not well specified (e.g., are comparative *-er* and *more* the same morpheme)? Individuating morphemes by meaning is in turn complicated by context-dependent variations in meaning. The *throw* in *throw up* is usually taken to be the same morpheme as in *throw a ball*, especially because it shares the irregular past and participle forms. But does *throw* really have a core meaning in common across the two contexts? Then there are morphemes that seem not to have an independent meaning at all (e.g. the *cran-* in *cranberry*), cases in which the same meaning has fully different forms in different contexts (e.g. the plural *-en* in *oxen*, or the suppletive alternations like *go*/*went*), cases in which the *absence* of an affix expresses a meaning (*null exponents*), and cases like *reduplication* in which it is the repetition of some other form in the context that expresses meaning (e.g. languages in which the plural of *cat* is expressed as *catcat*).

Why have units of morphology been so hard to define? One answer is that the confusing subfield of morphology is what you get when you make the mistake of assuming a set of enumerable, independent lexical items that bundle meaning, syntax, and phonology in the same way. If you instead assumed from the outset that the stored mappings between meaning, syntax, and phonology are complex and variable in human language such that there's no canonical geometry for these mappings cross-linguistically, then there's no privileged type of information or mapping that defines a *word*, and it's no longer clear what we need *morphology* for.

What makes the *vomit* expression different from the *throw up* expression? Both are mappings from the same meaning, but one maps the meaning to a single syntactic element and a corresponding phonological form, and one maps the meaning to a syntactic phrase and several corresponding phonological forms. What makes the *more beautiful* expression different from the *prettier* expression? They each map a complex comparative meaning to a complex syntactic

[4] This is not the only definition, which also contributes to confusion in the literature. A variant of the traditional view is that *morpheme* is the name for the pairing between sound and meaning. In recent decades, the popular Distributed Morphology framework (Halle & Marantz, 1993), has taken *morpheme* to name only a syntactic unit; this usage notably departs from the source meaning of the Greek root *morph* as shape/form.

phrase, and where they differ most clearly is in the structure of the phonological/prosodic object they get mapped to (e.g., a pause can be inserted between /mɔr/ and /bjutəfəl/, but not between /prɪti/ and /ər/). What makes the *seahorse* expression different from the *squid* expression? Each express an animal concept, but with *seahorse* that single meaning gets mapped to two phonological forms[5].

If we drop the traditional *lexical item* assumption and assume more varied mappings as the default, we can effectively characterize all these phenomena without needing to appeal to special notions like *word*, *morpheme*, *morphological complexity*, or *morphological decomposition*. Through various implementations and to various degrees, this is the approach taken by a wide range of linguistic theories today, including Amorphous Morphology (Anderson, 1992; Aronoff, 1994), Distributed Morphology (Halle & Marantz, 1993), Construction Morphology (Goldberg, 2006; Booij 2010), Nanosyntax (Starke, 2009), Relational Morphology (Jackendoff & Audring, 2020), and Spanning (Ramchand, 2008; Svenonius, 2016). Despite vast differences in their viewpoints and perspectives, these authors all agree that abandoning the traditional lexical item is necessary to achieve good coverage of the full range of human language expressions.

Replacing *lexical item* with *lexical path* in psycholinguistics would allow us to pursue this theoretical insight, with similar advantages. Instead of needing to posit special kinds of representations like *superlemmas* (Sprenger, Levelt & Kempen, 2006) to handle idioms and "morphologically complex" words, or special kinds of processing routines for "morphological decomposition", the lexical path characterization allows the possibility that the human language architecture can handle a wide variety of mappings between meaning, syntax, and phonology by default. If a particular form of mapping is more common than another in a particular language then parsing routines may develop to facilitate it, but this doesn't need to be built into the architecture. Work traditionally done under the heading of "morphological processing" in comprehension could instead be fully folded into the psycholinguistic literatures on syntactic, phonological, and orthographic parsing, which would themselves become better integrated with each other. This would also make it easier to integrate a wide range of languages with different mapping strategies into psycholinguistic theory. Currently, languages with non-English mappings—e.g. the non-concatenative phonological systems of Arabic or Hebrew, the phonological reduplication of Tagalog or Malayalam, the high degree of affixing in languages like Turkish, Finnish, or Inuktitut—are often treated within psycholinguistics as exceptional challenges to the processing system (see, e.g., Krauska & Lau, 2023). Transitioning to *lexical path* terminology would make it straightforward to discuss different kinds of mappings on neutral ground.

[5] Whether the syntactic component of English nominal compound expressions is simple or phrasal is not yet clear; see Cuonzo, Macdonald & Lau, 2026 for review).

7. Production and comprehension

Items are definitely not directional, but paths can be understood to be. The driving route from A to B and from B back to A will usually cover slightly different regions of space, especially if it includes one-way streets. If I am not in good physical shape, I might be able to take a path from the top of the mountain to the bottom, but be incapable of taking a path in the reverse direction.

Ending here on a slightly more speculative note, *lexical path* terminology may turn out to be useful for characterizing dissociations between the availability of linguistic knowledge in comprehension and production. In first language acquisition, it is well-known that children's production abilities tend to lag substantially behind comprehension abilities (e.g. Shipley et al. 1969; Clark & Hecht, 1983; Fenson et al., 1994), and it has been suggested that the "vocabulary spurt" observed during the second year of life in production may contrast with an earlier, steadier increase in comprehension (Woodward et al. 1994; Bloom, 2002). This lag might seem puzzling on a view in which lexical knowledge takes the form of bundled items which can be "activated" all-or-none. *Lexical path* terminology makes the directionality and non-invertibility of linguistic access operations more salient. A child may have acquired a lexical path from a phonological wordform to a concept, but may not yet have fully developed the corresponding reverse lexical path that allows them to go from the concept to articulating the phonological form that expresses it. Analogously, adult speakers may experience a tip-of-the-tongue state in which they cannot fully traverse the lexical path from the concept to articulation of the phonological form, but they can immediately recognize the intended expression when they hear it, easily traversing the "opposite" lexical path from phonological form to concept. And patients with aphasia may be able to produce an expression without being able to comprehend it, or vice versa. These production-comprehension asymmetries may well have different underlying causes, but the directionality naturally provided by the lexical path metaphor might make the alternative hypotheses easier to state.

8. Conclusion

In this paper I have not made a theoretical proposal, but a practical, terminological one. I have proposed that in psycholinguistics we stop using the standard term *lexical item* and instead replace many of its uses with *lexical path*. I have provided arguments that the *lexical path* terminology better fits the dominant approach to morphology across a wide range of linguistic frameworks today, and better fits the observed properties of human language knowledge in English as well as the diversity of languages around the world. Retiring metaphors and terminology that no longer match current understanding is a difficult, but crucial, component of scientific progress.

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