Opinion

Good-enough language production

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Our ability to comprehend and produce language is one of humans' most impressive skills, but it is not flawless. We must convey and interpret messages via a noisy channel in ever-changing contexts and we sometimes fail to access an optimal combination of words and grammatical constructions. Here, we extend the notion of good-enough (GN) comprehension to GN production, which allows us to unify a wide range of phenomena including overly vague word choices, agreement errors, resumptive pronouns, transfer effects, and children's overextensions and regularizations. We suggest these all involve the accessing and production of a 'GN' option when a more-optimal option is inaccessible. The role of accessibility highlights the need to relate memory encoding and retrieval processes to language comprehension and production.

'when I was in court I forgot what to call the judge and I accidentally called him Your Majesty and he was like WHAT and I REPEATED IT 😂 😭 ' – vidawggg on Twitter

Language processing is impressive but imperfect

Humans are remarkably adept at using language to communicate their ideas, but language processing does not operate flawlessly. People may misinterpret what they hear or see: for example, *The dog was bitten by the professor* may be misunderstood as the more plausible utterance *The dog bit the professor* [1]. In this review, we extend the familiar idea of 'good-enough (GN) comprehension' to the arena of production to focus on when and why language users produce utterances that are only good enough rather than optimal. We begin with a brief description of GN comprehension before proceeding to the focus of our opinion article, a range of phenomena that constitute evidence of GN production, with examples from adult and child speech. We then discuss the relationship between GN comprehension and production and the implications for language processing generally.

GN comprehension is recognized to reflect a divergence between what a person says and what the comprehender understands. It is illustrated with systematic errors evoked in experimental contexts, as illustrated in Table 1 (for a review see [2]). Since it is widely accepted that comprehenders combine all available cues – contextual, semantic, and formal – to incrementally access relevant prior linguistic and non-linguistic representations required for interpretation [3–6], here we more specifically characterize GN comprehension as resulting from a failure to access the particular combination of linguistic tools – lexical and grammatical constructions – that were generated by the speaker or a failure to access them fully during the interpretation of the utterance. Note that this interpretation of GN comprehension differs slightly from what is commonly meant by 'shallow parsing', although the terms are often used interchangeably. GN comprehension is broader, as it allows for misinterpretations from sources other than imperfectly parsed syntax. For instance, a classic example of GN comprehension, the 'Moses illusion' ([7], see Box 1) results from a failure of appropriate lexical access rather than any misparsed syntax.

Highlights

The possibility of good-enough (GN) language production has rarely been raised until recently, although GN comprehension is widely recognized.

The production of overly vague words, agreement errors, and resumptive pronouns as well as children's overextensions and regularizations all illustrate GN production.

GN production occurs when a language user accesses a nonoptimal albeit semantically relevant lexical or grammatical construction to express their intended message because a more-optimal construction is inaccessible at the moment of speaking (or signing).

Accessibility is increased by contextual cues, frequency, and priming and decreased by interference from competitors.

Communication is reasonably successful despite imperfect encoding or retrieval from memory because neither production nor comprehension is brittle.

The current work allows comprehension and production to be brought into closer alignment and encourages increased focus on accessibility from memory.

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Table 1. Categories of examples that tend to lead to GN comprehension

Lexical misinterpretations	
How many of each kind of animal did Moses take on the Ark? *What's the name of the Mexican dip made with mashed up artichokes?* *After an airplane crash, where should the survivors be buried?*	Responses such as 'two', 'guacamole', and 'in a graveyard', respectively, due to: (i) priming of a relevant semantic frame; (ii) semantic and/or phonological relatedness between the witnessed and intended words (*Moses ~ Noah*; *artichokes ~ avocado*; *survivors ~ victims*) [7,85]
Misinterpretations of grammatical constructions	
The dog was bitten by the professor	Misinterpreted as 'The dog bit the professor' due to easier accessibility of (i) the more plausible and familiar semantic frame and (ii) the transitive construction being more frequent than the full passive [1,86,87]
The ancient manuscript that [the grad student who the new card catalog had confused a great deal was studying] was missing a page	Misinterpreted as acceptable even without the underlined obligatory verb phrase, in part due to complexity-induced overload of working memory [88–91]
While Keisha changed the baby played in the crib	Misinterpretation due to a failure to (i) inhibit 'Keisha changed the baby' and (ii) to access the reflexive meaning of 'changed'; due to interference as a result of *local coherence* – the naturalness of a word sequence within an utterance [8,92–94]

GN comprehension can alternatively arise from fully accessing an incorrect grammatical (syntactic) construction. This understanding allows us to bring GN production into focus.

Good-enough (GN) production

The term 'good-enough production' has rarely been invoked (but see [8–10]), despite the widespread recognition of GN comprehension. One reason for this may be the perspective clearly articulated by one expert who viewed comprehension errors as arising from a failure to process syntax and notes the lack of a clear analog in production:

'many of the aspects of a sentence's surface form appear to play a relatively minor role in comprehension, in comparison with higher level semantic and knowledge integration processes… [I]n sentence production, on the other hand, it is necessary to create a surface structure… [and] to do so requires the paraphernalia of the correct morphology, constituent structure and order' ([11], see pp. 1–2).

By contrast, here we emphasize that both comprehenders and producers have a complex suite of lexical and grammatical tools with which to express a message or interpret an utterance. When the language user is unable to access the right tools for the job or is unable to access their form or content fully, they instead settle on options that are not optimal but which they believe (or hope) are good enough. During production, forms are necessarily articulated, but the selected forms do not necessarily optimally convey the intended message. That is, GN productions are utterances that only approximate an optimal way of expressing a speaker (or signer's) intended message because of a failure to access optimal tools at the moment of speaking.

The claim that an utterance is nonoptimal predicts that speakers of the same dialect would, in principle, recognize it as nonoptimal, which can be demonstrated via judgment tasks, paraphrase tasks, or explicit comparisons with an alternative (e.g., [12–14]). As is true for GN comprehension, GN production may result in miscommunication. However, as is also true of GN comprehension, a GN utterance may alternatively be good enough to avoid communication failure. That is, the

extent to which GN processing results in miscommunication in naturalistic contexts remains unclear [15–20]. As the term 'good enough' suggests, a failure to interpret each and every sentence strictly veridically does not necessarily lead to miscommunication [16,17] and neither does the production of a nonoptimal utterance. For instance, if asked in a natural context, 'How many of each kind of animal did Moses bring on the Ark?' it may be more appropriate to respond 'two' than to object that the speaker should have asked about Noah. After all, speakers rarely intentionally mislead their audience in the way that experimenters do. GN comprehension, then, may be an adaptive response to the reality of GN production. It can be useful for comprehenders to infer an interpretation that reflects what the speaker is likely to have meant even if that differs from what was literally stated [16–18].

Accessing any representation from memory is recognized to be affected by multiple interacting factors. Accessibility is positively influenced by relevance, appropriateness, frequency, and priming and is negatively influenced by noise, interference, competition, and time pressure [10,21–28]. Accessibility is also influenced by task demands [29–31]; for instance, we expect comprehenders to interpret implausible utterances more quickly and accurately when tasked with judging their plausibility (e.g., [30]), and likewise, errors are detected more readily when participants are asked to act as fact checkers [31].

By emphasizing that GN production involves accessing a GN option rather than one that is optimal, it becomes clear that the psycholinguistic literature provides many examples of GN production by both adults and children.

Good-enough production in adults
Lexical choices
The epigraph of this opinion article provides a memorable example of the production of a lexical phrase that is nonoptimal but in the right semantic ballpark, influenced by accessibility (*Your Majesty* rather than *Your Honor*). Overly vague terms, such as those underlined in (i), provide another straightforward illustration of GN production:

(i) Does this house have a tea thingy? Like, um... You know what I mean, like, um... Like a hot water source. A kettle! Kettle. A kettle. Man, I am not doing great. (COCA MOV 2019 [32])

The underlined words in (i) are fully accessed and clearly articulated, but the speaker does not view them as optimal, as is made explicit in the rest of the passage (cf. *kettle*). That is, since *kettle* is not immediately accessible to the speaker, nonoptimal formulations are used instead as reasonable approximations (e.g., *thingy*, *a hot water source*).

The role of accessibility in language production is supported by a good deal of experimental work. For example, a higher-frequency word, being more easily accessed, is more likely to be used to convey a novel related meaning than a semantically similar less-frequent word [10,33,34]. Beyond frequency is the positive influence of priming on lexical choice. In one series of experiments, participants were given a preamble such as *The woman went to the convent to become a __* and were then asked to immediately label an image of a priest [9]. Participants produced *nun* rather than *priest* roughly 20% of the time. Participants were also lured by phonological accessibility. For instance, following *I thought there would still be some cookies left but there were __*, participants labeled the image of the priest *nun* 10% of the time. In both cases, participants produced a description (*nun*) that was made highly accessible and that was in the semantic ballpark of an optimal description (*priest*) but clearly not the optimal form.
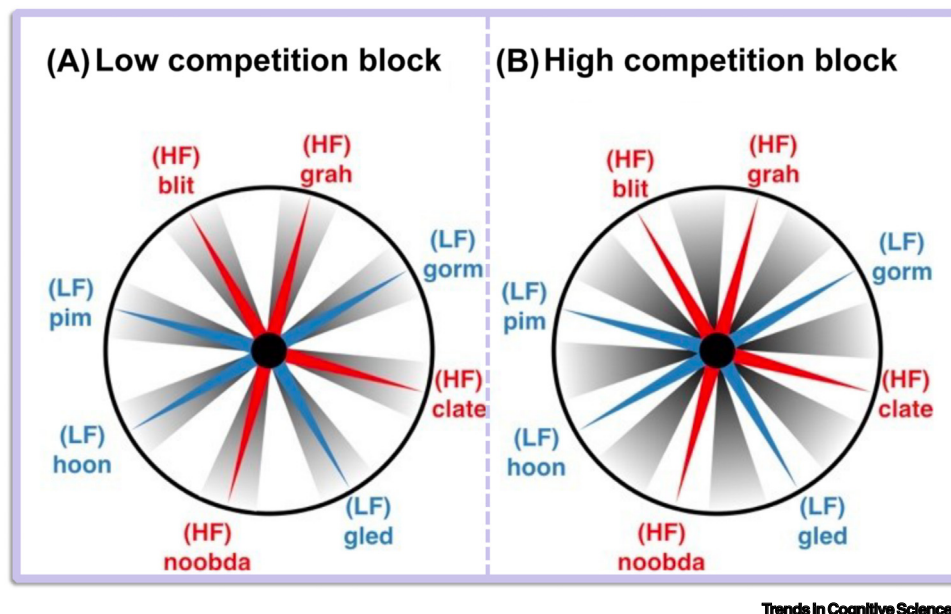
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Figure 1. Positions on a circle were labeled with high-frequency (HF) and low-frequency (LF) novel words. Participants were taught HF and LF novel words for particular angles and were then queried about various angles between them (in gray). High competition trials included the angles close to the midpoint of two named angles. Under time pressure, participants showed a tendency to use the HF words, even when a LF word would have been more accurate. Image from Koranda *et al.* (2018) [10].

Recent results from another clever experiment demonstrate that speakers are willing to sacrifice accuracy in favor of a GN option that is more accessible even without prior priming [10]. Adults were taught eight novel words that named particular compass angles; four of the novel terms were witnessed less often than four other terms, making them lower frequency in the context of the experiment (lower frequency vs higher frequency; Figure 1). When asked to name angles that fell between those that had been labeled (indicated in gray), speakers tended to use the higher-frequency terms, even when a lower-frequency label more accurately described the angle. When no time pressure was imposed, speakers were able to access and appropriately use the lower frequency novel terms, demonstrating that the failure to use them when a speedy response was required was due to the challenge of accessing them rather than a failure to learn them at all [10]. The study also found that participants responded more slowly as the target angle was closer to the middle of two angles (Figure 1B), since these positions rendered the competition between two labels stronger.

Agreement errors

The idea that we access and combine lexical and grammatical constructions during production, occasionally retrieving a competing but nonoptimal option, finds support in work on systematic 'agreement' errors; for instance, speakers regularly produce verbs that erroneously agree in number with the noun that happens to immediately precede rather than with the subject of the sentence. For instance, in (ii), the plural verb *were* agrees with the plural noun *earrings* rather than the singular noun *value*:

(ii)   I don't know what the <u>value</u> of the earrings <u>were</u>. (COCA_SPOK_2004 [32])

To produce the more-optimal verb form (*was*), the speaker needed to reactivate the subject noun (*value*) and suppress interference from the plural noun *earrings*. Agreement errors are influenced

by meaning: they increase when a formally singular subject receives a plural interpretation (e.g., *the label on the bottles were*) [35] and they are more difficult to detect when there is a strong semantic association between the intervening noun and verb (e.g., *the drawer of knives cut*) [36]. Another influence in English is the existence of a competing (quantificational) construction in which N_2 rather than N_1 is the controller of agreement, as in (iii) [37]:

(iii)   A lot of the <u>books</u> *are*
        (cf. The <u>cover</u> of the books *is*)

Speakers with stronger working memory are more successful at inhibiting interference from the intervening noun and irrelevant competing construction [35,38], as is expected if such errors arise as the speaker aims to inhibit nonoptimal constructions to access an optimal one [37,39]. By recognizing that speakers need to access grammatical patterns as well as words, we predict that languages with different inventories of grammatical constructions will be affected by lexical accessibility in different ways, as has been found to be the case [40].

When no optimal option exists: resumptive pronouns in English

Speakers (and signers) aim to produce an optimal combination of constructions to express their intended messages in context. At the same time, production is incremental in that language users do not fully access all words and constructions before they begin their utterances. This can lead language users to find themselves midway through an utterance without an optimal combination of constructions available. In this case, they often carry on as best they can, even if doing so results in an utterance that sounds awkward or contains an error. This can be illustrated by resumptive pronouns in English relative clauses (RCs).

Fully acceptable English RCs can be thought of as containing a 'gap' where the head noun would normally appear in a canonical clause. For instance, in (iv) *certain codes* appears before the RC, not after the verb, *broken*, as it would in a simple clause (*she had broken certain codes*):

(iv)   She knew <u>certain codes</u> that no one suspected she had broken ___.

Certain grammatical and discourse contexts disfavor gaps for reasons that remain debated, (e.g., [41,42]). For instance, English speakers judge sentences such as (v) to be relatively unacceptable:

(v)   There are certain codes that if you break ___, you suffer something much worse than political defeat.

The sentence in (v) is improved by the inclusion of a 'resumptive pronoun' at the gap site as in (vi), which is likely due to the local formal and semantic acceptability of the phrase – *if you break them* – in isolation.

(vi)   'There are <u>certain codes</u> that if you break <u>them</u>, you suffer something much worse than political defeat' [43].

The presence of a resumptive pronoun improves certain utterances [e.g., (vi) vs (v)], but it does not make them fully acceptable [44]. Moreover, recent work has found that English sentences with resumptive pronouns can more difficult to comprehend than grammatical controls [45]. Thus, a relative clause with a resumptive pronoun is nonoptimal in that it is inelegant and

somewhat difficult for listeners to process. It is used, as a GN formulation, presumably because English does not provide an optimal means to continue the message in (vi) once the embedded clause (*that if you*) is begun. That is, English does not provide a simple way to introduce an entity while predicating a property of it in the same clause [which is presumably why (vi) was published in the prestigious *New York Times*].

It is surprisingly easy to elicit utterances containing resumptive pronouns in experimental settings. For example, in one study [46] participants were shown a series of trials comprising an image of an entity followed by a brief phrase. Through a combination of instructions and priming, participants were encouraged to produce utterances that began, *This is a <image-label> that <phrase>*. After trials such as those in (vii), if a third trial provided the phrase 'don't know,' speakers tended to produce a relative clause with a resumptive pronoun, as in (viii):

(vii)   Experimenter: (image of a donkey + 'lives in California') 'What is this?'
        Participant: *This is a <u>donkey that</u> lives in California*.
        Experimenter: (image of a donkey + 'lives in Brazil') 'What is this?'
        Participant: *This is a <u>donkey that</u> lives in Brazil*.
(viii) Experimenter: (image of a donkey + 'don't know') 'What is this?'
        Participant: *This is a <u>donkey</u> that I don't know where <u>it</u> lives*.

While GN productions are generally reduced if there is no time pressure, in this case, since no more-optimal form was available, participants tended to produce resumptive pronouns even when no response deadline was imposed. Thus, speakers generally do the best they can, but given contextual and linguistic constraints, their best efforts can sometimes reliably lead to GN utterances.

Good-enough production in children
Children have less exposure to language than adults and slower lexical access [47]. Therefore, they are more prone to producing GN options than adults. Several apparently distinct types of child errors can be unified as GN productions, as described below [48].

Overextensions
Young children tend to overextend their early-learned words, applying them more broadly than is appropriate. For instance, a child may use *dog* to refer to cows, horses, or other animals. However, if a child who overextends the word *dog* is shown pictures of a dog and a cow and asked 'Which is the dog?', they reliably point to the dog and not the cow [49–51]. This indicates that these children know that *dog* refers to dogs, or at least that dogs are better instances of the word *dog* than cows are. Why, then, do children ever use *dog* to label a cow? Presumably, it is because the better option (in this case, *cow*) has not yet been learned or is insufficiently accessible to the child at the moment of speaking. Since *dog* is highly accessible due to its high frequency, and since it is from the same general semantic domain (terms for animals), the word *dog* serves as a GN description for the intended message from the child's perspective, given their limited vocabulary. Similarly, young children often rely on a deictic term (e.g., *that*) or simply point [52,53], which provide other GN solutions to the inaccessibility of a more conventional way to convey their intended message.

(Over)regularizations
We know that when preschool-aged English-speaking children are told that a novel creature is a *wug*, they reliably describe two novel creatures as *wugs* [54]. This requires them to: (i) implicitly

recognize that the plural inflection is semantically appropriate, and (ii) access it from memory. Children's *in*correct uses of productive morphology are no different. That is, children often produce *foots* instead of *feet* or *goed* instead of *went*, applying regular inflections to irregular words. Suggestive evidence that overgeneralizations in morphology are due to GN production rather than a commitment to the incorrect forms comes from the fact that children vacillate between correct and incorrect forms for an extended period [55]. From a GN production perspective, whether a child produces an appropriate irregular form depends on whether it is accessible at the moment of speaking. This predicts that correct forms should be more accessible in the context of familiar phrases, since parts of a phrase can be expected to prime other parts [33]. Indeed, children are more likely to produce irregular forms correctly within frequent phrases (e.g., *brush your teeth* vs *my tooths hurt*) [56]. Also, in an elicitation task [57], while 5–6-year-old children produced overgeneralization errors and judged them to be acceptable roughly half the time (e.g., *eated*, *ated*), they judged the *correct* forms (e.g., *ate*) to be acceptable virtually *all* – 98% – of the time. This indicates that children have memory traces of the correct forms they have witnessed, as they reliably recognize them when they are provided, but children sometimes fail to access the conventional form at the moment of speaking or judging, in which case they generate or accept a GN form instead.

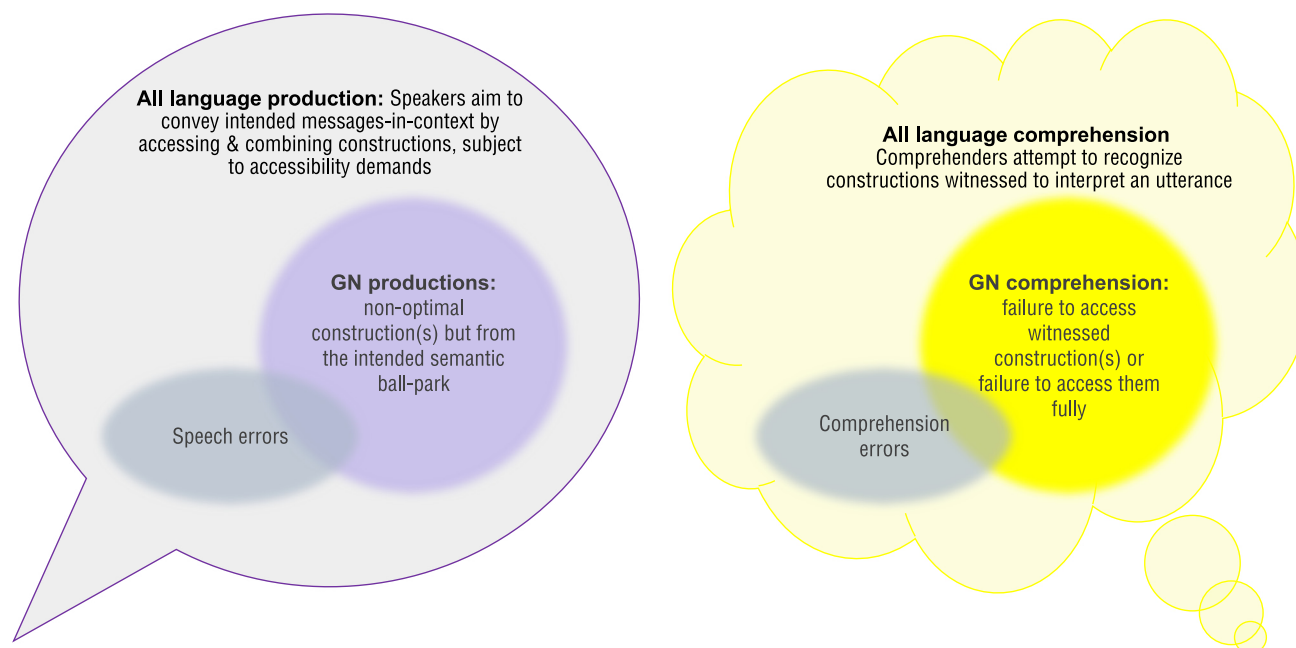### Regularization/simplification of grammatical constructions

When children are briefly exposed to a mini-artificial language in which a meaningless morpheme is included in 60% of utterances, they display a tendency to either regularly produce the morpheme or systematically omit it [58]. Adults, by contrast, are far more likely to match the probabilities witnessed in the input [58,59]. Initially this finding was framed as a demonstration that children displayed an appropriate tendency to 'regularize' language [58] or that children may have a 'regularization bias' [60]. Instead, however, children may simply produce GN utterances before they learn the social, semantic, and discourse factors that condition the variation (natural language variation is nearly always conditioned in some way or other) [61]. Evidence comes from a study that introduced children to a kind of variation that exists in many natural languages that children reliably learn. In particular, adults and 4–6-year-olds were exposed to a mini-artificial language with two determiners. One determiner was systematically applied to stereotypically female puppets and one inanimate puppet, while the other determiner was consistently applied to stereotypically male puppets and a different inanimate puppet [62]. After multiple rounds of exposure, the experimenter elicited descriptions of the familiar puppets and new gendered puppets. As expected, adults applied the novel determiners systematically and extended them to new gendered puppets in a way that was congruent with the puppets' assigned genders. The children, by contrast, failed to learn the semantic conditioning, likely because the gender cue was not always available [63]. They instead tended to produce only one or the other novel determiner with the vast majority of the puppets, as they do when faced with random variation: From the children's perspective, the input did vary randomly. However, since generations of German- and Spanish-speaking children successfully learn gender systems that reflect a combination of natural gender and lexical conditioning, it is clear that the children's behavior was a temporary experimental artifact due to the limited exposure they had witnessed. We suggest that children's tendency to regularize is an example of GN production insofar as accessing a single form repeatedly is easier than toggling back and forth between two forms that vary in a way that cannot (yet) be predicted. A key piece of evidence that children's tendency to regularize involves GN production comes from judgment studies. When both options are offered to children, thereby eliminating accessibility demands, children display recognition and acceptance of both [58,62].

To summarize, the reason children tend to temporarily overextend the meaning of words, over-generalize inflectional morphology, and simplify variation they perceive to be random, is the same: if children are unable to access a more-appropriate option, potentially because no other option is perceived to be more appropriate, they simply produce an accessible option that is good enough [48]. Children, like adults, work with the tools they have available in the discourse contexts in which they find themselves. The main difference between children and adults is that, due to lack of experience with language, children have fewer tools at their disposal and the tools they have are less easily accessible. Space prevents us from discussing adult language learners, but GN is clearly influential in this case as well [64–66].

Good-enough production and comprehension

As indicated in Figure 2, we have portrayed GN production and comprehension as distinct from optimal production and comprehension and we have focused here on relatively clear cases of GN processing. At the same time, there is a growing recognition that speakers must access and combine grammatical constructions as well as words [33,37,38,48,67], and we endorse the idea that production and comprehension always involve an attempt to access an optimal combination of lexical and grammatical constructions to express a message or interpret someone else's. By shining a light on GN processing, we intend to draw attention to the importance of accessibility in language processing generally [67]. GN productions occur when a competing and nonoptimal option is retrieved, resulting in a nonoptimal utterance. Parallel factors that influence the GN production and comprehension of constructions, whether lexical items or grammatical patterns, are specified in Figure 3.

To summarize, speakers (and signers) aim to produce an optimal combination of constructions to express their intended message in context, but they are constrained by their ability to access the required lexical and grammatical constructions. We appeal to *optimal* combinations of

All language production: Speakers aim to convey intended messages-in-context by accessing & combining constructions, subject to accessibility demands

GN productions: non-optimal construction(s) but from the intended semantic ball-park

Speech errors

All language comprehension Comprehenders attempt to recognize constructions witnessed to interpret an utterance

GN comprehension: failure to access witnessed construction(s) or failure to access them fully

Comprehension errors

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Figure 2. A Venn diagram of the relationship between language production generally, good-enough (GN) production, and speech errors. (Relative sizes are not drawn to scale as the extent of overlap remains unclear.)

Good-enough production	Good-enough comprehension
No opportunity to encode or weak encoding	
○ Avoidance of newly learned low-frequency forms ○ Children's overextensions, and regularizations	○ Vague interpretation of unfamiliar jargon ○ Misinterpretations in less dominant language
Interference during retrieval	
A more accessible form with related meaning is accessed ○ Word-substitutions, blends ○ Certain code-switching between languages ○ Agreement errors	A more plausible or predictable interpretation is accessed ○ Agent-1st rather than passive interpretation ○ "Moses illusion" ○ Attachment errors
Partial but incomplete access	
○ Using a construction without implying all aspects of its meaning ○ Tip of the tongue phenomenon	○ Vague or incomplete interpretation

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Figure 3. Parallel factors influencing good-enough (GN) production and comprehension with example phenomena.

constructions rather than 'ideal' combinations to avoid assuming that there exists an ideal way to convey an intended message in context. The match between the constructions of the producer and those of the comprehender is always approximate rather than ideal [68], since linguistic representations are subject to individual variation [69]. Moreover, insofar as conventional linguistic resources are based on prior linguistic experiences, using familiar resources in novel contexts requires those resources to be extended, if only in minor ways [48,68]. In addition, optimal utterances are neither maximally explicit nor maximally precise, since language users tend to be efficient [17,70–74]. In these ways, an intended message in context may never be *perfectly* or *ideally* matched by a combination of words and grammatical constructions. Instead, language users aim to access an optimal combination of constructions to express a message in context [48]. With this in mind, it is possible to construe all language production as GN production, insofar as our utterances only ever approximate our intended message. Again, we have focused here on clear cases, in which speakers of the same dialect would agree that that an utterance is nonoptimal.

Concluding remarks

GN productions occur when speakers (or signers) access and combine lexical and/or grammatical constructions that are in the intended ballpark semantically but are less than optimal for expressing the intended message. This offers a unified way to view a wide range of production phenomena ranging from errors (agreement errors, children's overextensions) and vague word choices (*thingy*) to quasi-conventional language (resumptive pronouns in English). By recognizing the variety of phenomena that reflect GN language production, we aim to draw attention to the need to focus on factors known to influence accessibility in context, particularly those related to memory retrieval. Other outstanding questions come to the fore as well (see Outstanding questions).

The current review allows GN comprehension to be adaptive, at least some proportion of the time, because comprehenders need to infer the speaker's intended message and to do this they cannot rely exclusively on what was uttered. They instead rely on linguistic signals in combination with the nonlinguistic context and common ground to arrive at an appropriate interpretation in context [25,74–76]. Comprehenders may need to infer missing sounds, resolve lexical and syntactic ambiguities or vagueness, and derive appropriate inferences [4,19,25,72–84]

Outstanding questions

To what extent do speakers (and signers) adjust how closely the constructions they use approximate optimal choices? That is, GN production is a matter of degree (e.g., while the production of *kettle* is ideal, *the thing that heats water* is a better approximation than *thingy* is). Do speakers more closely approximate optimal options when they talk on the phone compared with when they interact face to face, for instance?

What role do other modalities, such as gesture, play in GN production? For example, if a speaker is unable to retrieve the word *pumpernickel* and says *dark bread* instead, are they more likely to produce a pointing gesture?

Can GN production involve full access of the form of a construction without full access of its function? This would seem to occur when we use a word or idiom without knowing precisely how it is conventionally used.

To what extend does the fact that nonoptimal productions tend to semantically approximate optimal productions follow from the nature of memory retrieval? That is, does the intention to access an optimal option predict that an option that is at least semantically related is likely to be accessed?

Is it reasonable to presume that optimal choices typically exist or does it make more sense to view all language production as only good enough, insofar as we always only approximate our intended messages?

Thus, comprehenders' understanding routinely differs from what was explicitly stated: the definition of GN comprehension.

The fact that language production is only good enough does not undermine the idea that languages are optimized for effective communication (e.g., [17,21,78,83]). A system cannot optimize for every possible utterance in every potential situation; instead, we rationally prioritize communication over perfection. It is useful for listeners to aim to interpret the speaker's intended message rather than trying to extract the literal meaning of an utterance, particularly if speakers produce less-than-optimal options to convey their intended messages on a regular basis. Interlocutors typically work together to confirm and elaborate their intended messages [76,84]. Because both production and comprehension are flexible, people can communicate ideas reasonably successfully despite the challenges that arise from imperfect access from memory, limited linguistic resources, and noisy environments. In this way, both GN comprehension and GN production reflect the fact that communicators allocate resources rationally (e.g., [17,72,78,80–83]). That is, GN production and comprehension combine to support effective communication, at least most of the time.

Declaration of interests

No interests are declared.

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