Syntactic priming in language production

Martin J. Pickering and Holly P. Branigan

People have a tendency to repeat the types of sentences they use during language production. Recent experimental work has shown that this phenomenon is at least partly due to ‘syntactic priming’, whereby the act of processing an utterance with a particular form facilitates processing a subsequent utterance with the same or a related form. In this review, we first provide an overview of the evidence for syntactic priming. The review will then explore the implications of this research for three different areas of language theory: the possible functional significance of syntactic priming in coordinating speakers during dialogue, the mechanisms underlying sentence production, and the nature of linguistic representation.

Both observational and experimental evidence indicate that people are more likely to use a particular syntactic (see Glossary) structure if that structure has recently been employed. A good deal of experimental evidence now strongly suggests that this tendency towards local syntactic consistency is at least partly the result of syntactic priming (sometimes called syntactic persistence or structural priming): the phenomenon whereby the act of processing an utterance with a particular form facilitates processing a subsequent utterance with the same or a related form. We argue that this finding is extremely interesting, because it provides a method that directly taps into syntactic processing. The present review assesses the importance of syntactic priming in language production for different aspects of the cognitive science of language.

Local syntactic consistency and syntactic priming

Good observational evidence for local syntactic consistency can be found in linguistic corpora. For example, a study of interviews showed that people tended to use passives more often when they had recently produced another passive. A study of natural conversation highlighted other examples, such as when one speaker said ‘I could you to sleep tonight’ and another responded ‘How am I going to sleep tonight’. Experimental evidence supports these findings. In one study, shop assistants tended to reply to (the Dutch equivalent of) ‘Where are you going? tonight?’ with ‘At what time do you go to sleep tonight?’, instead of something else like ‘At what time do you go to bed tonight?’ .

Syntactic priming and coordination in dialogue

Syntactic priming might occur purely as a by-product of syntactic processing, but an alternative is that it serves a functional role. One attractive possibility is that syntactic priming facilitates the use of dialogue. Speakers are faced with the highly complex problem of communicating an idea in a well-formed and fluent utterance, and therefore have to integrate a number of very different kinds of information. Thus, any means of reducing the computational load would be beneficial. Syntactic priming could be a means of reducing the load associated with syntactic processing, by...
facilitating production of particular syntactic structures. Listeners, on the other hand, are faced with interpreting syntactically ambiguous utterances. If listeners are sensitive to speakers’ tendency towards syntactic priming, then they have a better chance of resolving such ambiguities correctly. Clearly, then, both speakers and listeners would benefit from syntactic priming effects in dialogue, with speakers being primed by previous utterances and listeners being primed by those produced by other participants in the dialogue. These effects would result in local syntactic consistency in dialogue: a tendency for participants in a dialogue to produce the same syntactic forms. In other words, participants should tend to coordinate the syntactic structures of their contributions.

Research on the establishment of conventions predicts that speakers in a dialogue will coordinate their language. In keeping with this, there is good evidence for coordination at many levels in dialogue. In describing abstract means, participants tend to converge on particular types of description (e.g. descriptions based on paths between positions, or in terms of figures such as T-shapes or protruding limbs) and to use the same words as each other, in the same way. This is a form of semantic coordination in terms of the mental models employed by the participants. Work on the coordination of referential expressions suggests that participants form a ‘conceptual pact’ or temporary agreement about how to refer to an object. This conceptual pact may gradually develop through dialogue.

**Box 1. Evidence for syntactic priming from picture description**

Bock used the gaze of a memory test to investigate syntactic priming effects in individual speakers (Ref. 2). In her experiments, speakers abnormally repeated prime sentences and described semantically unrelated target pictures. Bock manipulated the syntactic forms of the sentences that speakers repeated. For example, the prime sentence might be an active in one condition (e.g. ‘The secretary behind the desk’ was as effective as ‘The secretary took a cake to her boss’ was effective as ‘The secretary took a cake to her boss’ was effectiveness as ‘The secretary gave a book to the man’ was effectiveness as ‘The secretary gave a book to the man’ was effectiveness as ‘The secretary gave a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was effectiveness as ‘The secretary brought a book to the man’ was

References

Clearly there are good theoretical grounds for predicting syntactic priming effects between speakers in dialogue, but is there empirical evidence to support this? The corpus evidence reviewed earlier includes demonstrations of local syntactic consistency between speakers in dialogue, but, of course, such studies can be explained without appeals to syntactic priming. There is also some evidence from memory recall experiments that priming for the production of particular syntactic forms can occur as a result of comprehension alone, but these findings relate to individual speakers outside a dialogue\(^1\). Recent work suggests strongly that syntactic priming does occur between speakers in dialogue when other explanations can be excluded (H. Branigan, M. Pickering and A. Cleland, unpublished data). Pairs of speakers took it in turns to describe pictures to each other immediately, and so subsequent use of that procedure is facilitated. They argued against an alternative explanation of priming, whereby priming is due to an episodic trace or phonological memory of a particular sentence\(^2\). Their obvious problem with this alternative is that the actual prime and target sentences can be very different (e.g. priming occurs when prime and target differ in words and fine-grained syntactic structure\(^3\)).

But the procedural account is problematic if priming occurs from comprehension to production. The procedure associated with comprehending a particular syntactic form must be different from the procedure associated with producing it, because the operation involved is reversed. However, there is another explanation of syntactic priming. The relevant information about syntactic form is the same in both comprehension and production (assuming that there is a rough correspondence between the sentences that people will produce and the sentences that they regard as natural, but representational assumptions made by theories of language comprehension and theories of language production do not always correspond.) We argue against an alternative explanation of priming, whereby priming is due to an episodic trace or phonological memory of a particular sentence\(^2\). Our obvious problem with this alternative is that the actual prime and target sentences can be very different (e.g. priming occurs when prime and target differ in words and fine-grained syntactic structure\(^3\)).

The mechanisms underlying sentence production

Bock and colleagues\(^1\) argued that producing a sentence involves the activation of procedures associated with producing a particular syntactic form. Thus, there might be a particular procedure associated with producing sentences like 'The teacher gave the book to the boy' (the prepositional–object form) and another associated with producing sentences like 'The teacher gave the boy the book' (the double–object form). The activation of a procedure does not disappear immediately, and so subsequent use of that procedure is facilitated. They argued against an alternative explanation of priming, whereby priming is due to an episodic trace or phonological memory of a particular sentence. Their obvious problem with this alternative is that the actual prime and target sentences can be very different (e.g. priming occurs when prime and target differ in words and fine-grained syntactic structure\(^3\)).

But the procedural account is problematic if priming occurs from comprehension to production. The procedure associated with comprehending a particular syntactic form must be different from the procedure associated with producing it, because the operation involved is reversed. However, there is another explanation of syntactic priming. The relevant information about syntactic form is the same in both comprehension and production (assuming that there is a rough correspondence between the sentences that people will produce and the sentences that they regard as natural, but representational assumptions made by theories of language comprehension and theories of language production do not always correspond.) We argue against an alternative explanation of priming, whereby priming is due to an episodic trace or phonological memory of a particular sentence\(^2\). Our obvious problem with this alternative is that the actual prime and target sentences can be very different (e.g. priming occurs when prime and target differ in words and fine-grained syntactic structure\(^3\)).
The idea that syntactic priming taps into knowledge of language, and as such can inform theories of syntactic representation, is clearly at odds with those linguists who believe that the domain of linguistics is not that of mental representations (Ref. a,b). In that view, linguistics seeks to produce theories of the structural properties of language defined as a collection of sentences, and the sentences of the language themselves constitute the only relevant data. In such accounts, the truth of a linguistic rule cannot be affected by anything that is represented in the mind. Even if this is a reasonable interpretation of one type of linguistics, there must still be a domain of enquiry concerned with understanding knowledge of language, and it is this domain that we are concerned with here.

Thus, most modern linguists follow Chomsky in assuming that linguistic theory is concerned with human knowledge of language structure and seek to provide an account of language contrasted as the mental representation of human linguistic capacities (Ref. c). For example, Chomsky says that ‘I would like to think of linguistics as part of psychology that focuses its attention on one specific cognitive domain and one faculty of mind, the language faculty.’ (Ref. d), and that ‘… evidence derived from psycholinguistic experimentation [and] the study of language use (e.g. processing)… should be relevant, in principle, to determining the properties of… particular grammars’ (Ref. e). Evidence from the theoretical difficulty, at least, of acquiring particular grammars is taken seriously in motivating linguistic assumptions (e.g. binary branching; see Ref. f). However, most linguists have, in practice, ignored processing evidence in the design of their theories. In part, this might be the result of disciplinary isolationism, but in part, it might follow from the more reasonable ground that processing theories normally invoke assumptions about the nature of the processor as well as assumptions about the representation of language. In sentence comprehension, at least, the great majority of work has not attempted to distinguish between different linguistic assumptions (Ref. g), though there have been exceptions (Ref. h). Chomsky makes the argument explicitly: ‘One common fallacy is to assume that if some experimental result provides coincident evidence to a theory of processing that includes a grammatical theory T and parsing procedure P, then it is T that is challenged and must be changed. The conclusion is particularly unreasonable in the light of the fact that in general there is independent (so-called ‘linguistic’) evidence in support of T while there is no reason at all to believe that P is true’ (Ref. e, p. 283, footnote 39).

References
a Chomsky, N. (1965) Language and Other Abstract Objects, Blackwell Science
f Kayne, R. (1986) Combinatorics and Binary Branching, Foris

Box 2. Linguistic theory and mental representation

The teacher gave the book to the boy

The racing driver showed the torn overall to the mechanic

The foreigner was loitering by the traffic lights

Trends in Cognitive Sciences – Vol. 3, No. 4, April 1999

developed a model of the lemma stratum to show how it could represent some syntactic information. His model included ‘lemma nodes’, which represent the base (i.e. uninflected) form of a word (e.g. give), and nodes that represent different types of syntactic information, such as category (e.g. verb). Pickering and Branigan11 argued that syntactic priming provides evidence about the organization of the lemma stratum. Their experiments employed written sentence completion, and varied whether the prime and target shared exactly the same form of the verb (e.g. gave), or whether prime and target employed either different forms of the same verb (e.g. gave versus give) or different verbs entirely (e.g. gave versus showed). Their experiments showed that priming was unaffected by whether the prime and target verbs were identical or differed in form (specifically, tense, aspect or number). These results indicate that when people produce sentences like ‘The teacher gave the book to the boy’ and ‘The racing driver showed the torn overall to the mechanic’, Pickering and Branigan accounted for these effects by proposing an extension of Roelofs’ model in which lemma nodes are linked to nodes encoding combinatorial information. They suggested that lemma nodes representing verbs that can be used with a particular syntactic form are directly linked to the same combinatorial node. In other words, base forms of verbs (e.g. give, show) draw upon shared representations of combinatorial information, in a manner that is not mediated by specific information such as tense.

One of the most important questions for this model relates to the nature of the combinatorial nodes. The findings of Book and Lodder12 and Potter and Lombardi13 indicate that priming takes place in the absence of an overlap in the types of event described in prime and target. They found that sentences containing a by-phrase that described a local action (e.g. ‘The foreigner was loitering by the traffic lights’) primed the production of passive targets containing a by-phrase that described the instigator of an action (e.g. ‘The boy was stung by the bee’). These findings suggest that the combinatorial nodes are purely syntactic in nature (rather than mediated by meaning). They also suggest that priming results from the combination of the verb and all the phrases associated with it, rather than the verb and phrase that express intrinsic parts of the verb’s meaning. For example, an intrinsic part of sting’s meaning is that some entity carried out the action of stinging. In ‘The boy was stung by the bee’, this is expressed by the phrase ‘by the bee’. Phrases that express intrinsic parts of a verb’s meaning are called arguments. In contrast, the meaning of at does not require specification of a location. Phrases that express non-intrinsic parts of a verb’s meaning, like ‘by the traffic lights’ in ‘The foreigner was loitering by the traffic lights’, are called adjuncts. The finding of priming between sentences involving argument phrases and sentences involving adjunct phrases suggests that the combinatorial nodes may not distinguish between adjuncts and arguments. In other words, the combinatorial nodes may specify what phrases a verb combines with, irrespective of those phrases’ relationship to the verb.

In addition, Harms and colleagues14 found priming effects based upon the order of particular phrases. In their
Box 3. Evidence from syntactic priming against grammatical transformations

Bock, Lushall and Morey (Ref. a) examined syntactic priming for active and passive sentences using the running recognition memory test paradigm (see Box 1). They primed the production of active or passive target sentences of pictures (e.g. of an alarm clock waking a boy) with an active or a passive prime containing either an animate or an inanimate subject. They found syntactic priming effects: participants produced more actives after an active prime and more passives after a passive prime. But they also found an independent priming effect for grammatical function assignment, which was based on animacy: after producing a sentence with an animate subject, participants were more likely to produce another sentence with an animate subject. For example, an animate subject in an active sentence primed an animate subject in a passive sentence. The interesting linguistic point in these cases is that the binding that was primed was the binding between the property of animacy and the subject of the sentence that was actually produced. In other words, speakers categorized together the subject of an active sentence and the subject of a passive sentence. These findings argue against ‘relation-changing’ theories of linguistics, in which the subject of a passive sentence is treated in the same way as the object of an active sentence (Refs b–d). Instead, they provide evidence for theories of grammar in which the role of transformation is reduced (Ref. e) or eliminated (Refs f,g).

References


g Chomsky argues that evidence from language processing is not informative about knowledge of language, essentially because any pattern of processing data (e.g. reaction times) is compatible with one grammar combined with one set of processing assumptions, or a different grammar combined with a different set of processing assumptions. Instead he favours the use of ‘linguistic’ evidence, most notably grammaticality judgements. The problem with his argument is that grammaticality judgements are themselves the product of language processing. We argue that syntactic priming is less affected by Chomsky’s criticisms than grammaticality judgements. First, participants are generally unaware of the priming manipulations or the purpose of the investigation and therefore the task provides evidence about mental representation without engaging explicit or conscious strategies. Conscious strategies, as employed in making grammaticality judgements, are obviously prone to bias. More fundamentally, however, grammaticality judgements provide direct evidence only about whether a sentence forms part of a language. They cannot provide direct evidence of which sentences are syntactically related. In contrast, syntactic priming arises from the language processor recognizing a syntactic relationship between two sentences. Thus syntactic priming is directly informative about syntactic categorization. Furthermore, because it is purely dependent on categorization, the inference from syntactic priming to theory of syntax is independent of particular assumptions about processing. (Explicit judgements of similarity, in contrast, may reflect non-syntactic similarities.)

We therefore claim that results from experiments about syntactic priming allow us to draw inferences about knowledge of language. For example, the finding that prepositional-object sentences prime other prepositional-object sentences, whereas double-object sentences prime other double-object sentences, with other sources of the priming being excluded, suggests that people’s knowledge of language represents a distinction between these two types of sentence; and the finding that syntactic priming occurs

experiments, the two alternative syntactic forms involved the same phrases combined in different orders. For example, participants might say ‘On the table is the ball’ or ‘The ball is on the table’, where the locative phrase (‘on the table’) appears before the verb and the subject (‘the ball’) appears after the verb, or vice versa. These results suggest that at least one component of syntactic priming may be related to the order of phrases; this ordering information might be encoded into the combinatorial nodes.

The evidence of syntactic priming in dialogue suggests further that the combinatorial nodes are shared between production and comprehension. As such, it provides good evidence for Levelt and colleagues’ proposal that the lemma stratum is common to both comprehension and production.

This claim is striking, because theories of language comprehension do not normally incorporate a lemma stratum.

Syntactic priming and knowledge of language

We have argued that syntactic priming is informative about a lemma stratum that is common to both comprehension and production, and that priming works by activating knowledge that is stored at this level. We therefore claim that syntactic priming taps into knowledge of language itself, and as such can inform linguistic theories that are concerned with accounting for knowledge of language (see Box 2). Chomsky argues that evidence from language processing is not informative about knowledge of language, essentially because any pattern of processing data (e.g. reaction times) is compatible with one grammar combined with one set of processing assumptions, or a different grammar combined with a different set of processing assumptions. Instead he favours the use of ‘linguistic’ evidence, most notably grammaticality judgements. The problem with his argument is that grammaticality judgements are themselves the product of language processing. We argue that syntactic priming is less affected by Chomsky’s criticisms than grammaticality judgements. First, participants are generally unaware of the priming manipulations or the purpose of the investigation and therefore the task provides evidence about mental representation without engaging explicit or conscious strategies. Conscious strategies, as employed in making grammaticality judgements, are obviously prone to bias. More fundamentally, however, grammaticality judgements provide direct evidence only about whether a sentence forms part of a language. They cannot provide direct evidence of which sentences are syntactically related. In contrast, syntactic priming arises from the language processor recognizing a syntactic relationship between two sentences. Thus syntactic priming is directly informative about syntactic categorization. Furthermore, because it is purely dependent on categorization, the inference from syntactic priming to theory of syntax is independent of particular assumptions about processing. (Explicit judgements of similarity, in contrast, may reflect non-syntactic similarities.)

We therefore claim that results from experiments about syntactic priming allow us to draw inferences about knowledge of language. For example, the finding that prepositional-object sentences prime other prepositional-object sentences, whereas double-object sentences prime other double-object sentences, with other sources of the priming being excluded, suggests that people’s knowledge of language represents a distinction between these two types of sentence; and the finding that syntactic priming occurs

Outstanding questions

• What is the precise nature of the linguistic representations that can be primed? Do they correspond to the representations assumed by a particular approach to syntax?
• In what sense is syntactic priming a kind of implicit learning?
• To what extent is priming affected by the nature of the communicative situation? Is it an automatic process that occurs irrespective of the situation, or is it more strategic, with producers being primed more if the previous utterances are in some sense more relevant to them?
• Can priming be informative about the stages that the processor goes through in the production of utterances?
• Which, if any, other levels of linguistic representation can be primed? Are there, for example, abstract levels of semantic representation that may be primed?
• Can priming be informative about the representations employed by diverse groups of language users, such as children, second-language learners, and various kinds of aphasics?
between sentences describing different types of event suggests that people’s mental grammars contain a syntactic component that is encumbered with information about the type of event described. Future studies may be able to determine precisely what primes what, thereby specifying the nature of syntactic knowledge in more detail.

One experiment that illustrates this potential was conducted by Bock and colleagues. Using the running recognition paradigm shown in Fig. 1, they found evidence that speakers treat the subjects of active and passive sentences alike (see Box 3). This finding supports linguistic theories which provide the same account of subjects in active and passive sentences and which do not treat passive sentences as “transformed” versions of active sentences.

Conclusions

Syntactic priming is clearly of considerable interest in its own right. However, we believe that it can be employed as a method that will allow us to appreciate the intricacies of syntactic representation and processing, just as, for example, semantic priming has allowed researchers to understand much about lexical–semantic representation. In contrast to work on semantic priming, however, there have only been a handful of studies on syntactic priming. The area is ready for a great deal of further exploration.

For example, there has been very little attempt to apply syntactic priming to the study of any population apart from normal adults. One recent study has looked at syntactic priming in Broca’s aphasia, and found, perhaps surprisingly, strong priming even when other aspects of language production were severely impaired. This suggests that such patterns often reveal knowledge of language, though they are not always able to use it appropriately. It also lends support to the claim that syntactic priming is largely an automatic, implicit process. A similar claim has been made about semantic and lexical coordination in young children’s dialogue. Priming might therefore be very effective in young children and those less practiced in language use. If so, skilled language-users might be less susceptible to syntactic priming, because they have more computational resources available and hence are more much more active about developing their communicative goals in syntactic detail. However, this is a question for further research.

This review has explored the importance of research on syntactic priming for theories of dialogue, accounts of the mechanisms underlying language production, and the nature of linguistic representation. It should be apparent that it has much to offer to all of these areas.

Acknowledgements

We thank Alexandre Giraud, Simon Garrod, Rob Hartsuiker and Andrew Stewart. The research was supported by a British Academy Postdoctoral Fellowship (awarded to K.J.) and ESRC research grant no. R000237148.

References

26 Stewart. The research was supported by a British Academy Postdoctoral Fellowship (awarded to K.J.) and ESRC research grant no. R000237148.