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Eitan Grossman and Ira Noveck
What can historical linguistics and experimental pragmatics offer each other?

Abstract: Language change is a central concern for any linguistic theory. For one thing, it is often assumed that language change is explanatory, in that it provides a reasonable answer to what Haspelmath (2014: 504) has dubbed 'Greenberg's Problem': why are languages the way they are? A short version of the Greenbergian answer is: 'Because they became that way through processes of language change.' However, this sort of answer throws into focus the fact that language change is not only a potential explanation for language structures. Rather, it is a set of problems that itself calls for explanation. In fact, this could be called 'Greenberg's Second Question': why do languages change the way they do? In this article, we explore some ways in which the field of experimental pragmatics might shed light on the second question, by providing a set of methods that could investigate existing hypotheses about language change by developing falsifiable predictions to be evaluated in experimental settings. And on the other hand, these hypotheses can provide new research questions and data for experimentalists to work on, beyond the rather restricted set of questions that experimental pragmatics has confronted to date.

1 The study of language change

Many linguists, especially those who work in functionalist or usage-based frameworks, have developed the early insights of Joseph Greenberg and Talmy Givón, in working out the ways in which language change is rooted in synchronic constraints on performance or usage. According to such views, language change essentially mediates between domain-general cognitive and physiological faculties and synchronic linguistic structures, as they are distributed within and across languages (Greenberg 1989; Givón 2001; Bybee 2008 and Bybee 2010; Blevins 2004). A central insight of this body of work is that synchronic linguistic structures are the result of synchronic constraints on language change, although the notion 'language change' can cover both regular, functionally-motivated types of change, on the one hand, and historical events that can lead to contact-induced change, on the other (Bickel 2007).

Language change can be studied in a number of ways:

- Through theories of change deriving from theoretical frameworks (e.g., Roberts 2007);
- Through reconstructing pathways of change based on the comparison of related languages (e.g., Gildea 1998);
- By inferring pathways of change from variation within speech communities or individuals, or studied in real time (Labov 1994);
- Through the study historical corpora (e.g., Gries and Hilpert 2012).

There is yet another way that language change has been studied, although it is less prominent than the other ways mentioned, and has been limited mostly to sound change: **language change can be modeled in experimental settings**. The experimental study of sound change is closely associated with the work of John Ohala (e.g., Ohala 1981, Ohala 1993) and today forms a major component of sound change research.

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For Ohala, phonetic bias factors, e.g. motor planning, speech aerodynamics, gestural mechanics, and speech perception, produce a pool of synchronic variation, which is the basis for sound change. For example, Ohala showed that the cross-linguistically recurrent phenomenon of 'emergent stops,' e.g., English *Thompson* (< Thom + son) or *empty* (< Old English *amtig*), develop due to the interaction of anatomical and aerodynamic features, which can be observed in experimental settings. Importantly, Ohala proposed that sound change is ultimately the result of the ways in which listeners perceive and represent the speech signal. In part due to the 'Ohalan Revolution,' which brought sound change squarely into the laboratory, we now have a tremendous body of data as well mature theories of sound change (see, e.g., the papers in Yu 2013).

The situation is only partially parallel in other domains of language change. While we have a similarly tremendous body of data for grammatical – mainly morphosyntactic and semantic – change, as well as highly articulated explanatory theories of why grammar changes the way it does, there has been no real analogue to the Ohalan Revolution. Even in the single field of grammatical change about whose regularities we know the most and whose mechanics have received the most detailed attention from theorists, grammaticalization, strikingly little experimental work has been done. And the relevant experimental research that has been done is often unknown to linguists working on grammaticalization.

Grammaticalization is, broadly, the complex process of change through which grammar emerges over time (for landmark studies, see Lehmann 1995 [1982], Hopper and Traugott 2003; Bybee et al. 1994; Heine and Kuteva 2002, and Narrog and Heine 2011). A central insight of grammaticalization research is that there are significant regularities of language change. For one thing, grammaticalization tends to occur in cross-linguistically recurrent 'pathways' of change, e.g., body part to adposition, lexical verb to auxiliary verb, expressions of desire to expressions of future tense, and many more.

These pathways are in fact the result of complex changes, in which further regularities can be observed: functional change precedes – and can indirectly induce, via changes in token frequency – formal changes, such as the loss of phonological substance and independence of items undergoing grammaticalization (e.g., English *going* to + V to gonna + V).

Most theories of grammaticalization are ultimately based on semantic and pragmatic – rather than purely syntactic – explanations, together with other domain-general aspects of usage, such as the role of frequency, informativity, and more. In fact, most theorists of grammaticalization argue that the kind of semantic change observed in grammaticalization is rooted in pragmatic mechanisms such as implicature and presupposition accommodation. The following are examples of hypotheses about the ways in which pragmatics, and more broadly, discourse structure, are implicated in semantic change and, ultimately, grammaticalization.

a. In Bybee et al. (1994), it is proposed that constructions that code a subject's intentions (e.g., goal-oriented motion events develop into future tenses, e.g., English *going to*). The authors attribute this change to 'pragmatic inferencing'.

b. In Traugott and Dasher's (2002) Invited Inferencing Theory of Semantic Change, regular semantic change is argued to be based on Neo-Gricean principles, which lead to the semanticization of inferences. Specifically, this theory argues that Particularized Conversational Implicatures (PCIs) made 'on the fly' are gradually conventionalized, becoming Generalized Conversational Implicatures (GCIs) and, eventually, coded semantic meanings of expressions.

c. Detges and Waltereit (2002) have proposed a 'Principle of Reference,' which says that listeners interpret contextual meanings as conventionalized meanings.

d. Eckardt (2009) has proposed a principle of 'Avoid Pragmatic Overload' (APO), which says that listeners, when confronted with utterances whose contextualized meaning cannot be interpreted using regular pragmatic mechanisms, e.g., presupposition accommodation, are coerced into novel form-function pairings.

e. The work of both Heine (2002) and of Diewald (2002) emphasize the importance of bridging contexts, which are discourse situations in which an utterance can be understood by a listener as involving the source meaning or an innovative meaning, but crucially, the innovative meaning is both more plausible in context and yet defeasible or cancellable.

f.   Outside of the (Neo-)Gricean framework and to different degrees, Ariel (2008), LaPolla (2003), and   1
Nicolle (1998) have explored explanations invoking Relevance Theory.

g.   Detges and Waltereit (2011) have argued that the structure of conversation, e.g., turn-taking strategies,
can play a role in language change.

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Since there is so much data about grammatical change, and so many ideas – some of which converge again
and again on the same basic hypotheses regarding the pragmatic and semantic mechanisms that lead to
grammatical change – we think that the time is ripe to bring grammatical change into the laboratory. This is
made possible by experimental pragmatics, which we sketch in Section 2. We think that both fields –
language change research and experimental pragmatics – have much to gain from being in closer contact.   10
On the one hand, experimental pragmatics allows the many pragmatically-based hypotheses currently on
the historical linguistics workbench to be evaluated in experimental settings; and on the other hand,
historical linguistics can contribute data, questions, and hypotheses to experimentalists who are looking
for challenges beyond the rather standardized set of problems that have been examined so far.
Interestingly, there is little work in this direction, with the notable exception of Jäger and Rosenbach   15
(2008), who argued that the unidirectionality of grammaticalization can be accounted for by asymmetrical
priming. This account leads, in principle, to the possibility of formulating falsifiable predictions that can be
evaluated experimentally. Today, this is the main challenge facing any collaborative research seeking to
evaluate language change experimentally: to translate hypotheses about the pragmatic basis of language
change into falsifiable predictions that can be tested experimentally, e.g., in terms of processing.   20
     We have to stress that this article is almost entirely exploratory, and is intended to spur mutual
awareness, interest, and eventually collaboration, between historical linguists and experimental pragma-
tists. We cannot yet point to an established set of experimental findings, and our ability to propose viable
experiments is still limited. However, we felt this fits the mission of *Linguistic Vanguard*.

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2 Experimental pragmatics: what is it and what can it do?

Experimental Pragmatics can be viewed as a subdiscipline of pragmatics, devoted to a) the testing and   30
refinement of pragmatic theories, as well as to; b) the discovery of pragmatic phenomena, through
psychological experiments. What does it have to offer a collaboration with language change research?
Through examples, we will underscore three features of Experimental Pragmatics that can be generalized to
neighboring disciplines:

–   An experimental pragmatic approach creates a fact-based database with respect to pragmatic phenom-   35
ena that can engage or counter armchair intuition as well as deflate accounts;

–   Experimental pragmatics has been especially successful when experiments provide a forum in which
theories, even quite disparate ones, can be tested against one another;

–   Experimental pragmatics shows how one can use psychology's panoply of tools to help determine
features that distinguish sentence meaning from its intended meaning in context.   40

To make this clear, we now summarize several lines of research that involve the experimental investigation
of pragmatic phenomena, primarily concerning scalar implicature, metaphor, and referring.
     The most investigated topic in experimental pragmatics is known as scalar implicature, which concerns
the way a weakly expressed utterance (e.g. *Some dogs eat shoes*) allows for a narrower interpretation (*Some*   45
but not all dogs eat shoes) than the linguistically encoded meaning does (*Some and perhaps all dogs eat*
shoes). Many accounts assumed – as do most adult intuitions – that the narrower, more informative,
reading occurs automatically or by default. Many experiments later, there is now a consensus that the
pragmatically enriched reading requires further effort when compared to the linguistically encoded one (see
Noveck and Reboul 2008; Noveck and Sperber 2007). So the intuition that underinformative utterances are   50

automatically understood in their most informative light is just not so. This can be seen both developmen- 1
tally and through comparisons among adults.

Younger children are more likely than adults to accept an utterance as true when it uses *some* in a
situation depicting all (imagine hearing *Some of the dogs are eating shoes* when all of five depicted dogs are
shown eating shoes). This result has been replicated across multiple languages, across labs, with different 5
sorts of materials, and not just with quantifiers (e.g., see Noveck 2001; Pouscoulous et al. 2007). Among
adults, one observes that enriched (more informative) readings are more effortful through reading time
studies (Breheny et al. 2006) and EEG studies (Nieuwland et al. 2010), indicating that there is nothing
automatic about enrichments. These counterintuitive findings were not surprising for some theories of
pragmatics (e.g., Sperber and Wilson's [1986] Relevance Theory) but represented a challenge for others 10
(e.g., Levinson's [2000] theory of Generalized Conversational Implicature).

While this form of inference highlights differing points of view, there are also cases where nearly all
intuitions were in agreement – and wrong – or at least were not borne out by experimental evidence.
Consider metaphor, which was historically considered an exceptional rhetorical device requiring excep-
tional resources. Many accounts have assumed that nonliteral interpretations become available only when 15
the literal meaning could not be computed (for a review, see Glucksberg 2003). These were further bolstered
by theoretical proposals. For example, Grice argued that a sentence is recognized as non-literal once it
violates the Maxim of Quality ("Do not say what you believe to be false") and engenders a process needing
resolution. However, several theorists have argued that there is nothing exceptional about metaphor
(Sperber and Wilson 2008). Importantly, experimentalists have confirmed that there is nothing exceptional 20
about its processing: e.g. in context, reaction times of metaphoric sentences are comparable to literal
controls (e.g. Gerrig and Healy 1983). At the same time, metaphoric interpretations, when plausible, are
difficult to suppress (Glucksberg et al. 1982).

As these examples show, experimental approaches allow us to evaluate the predictions made by
theoretical models or to test well-established intuitions and primarily through objective measures of 25
cognitive processing. This is directly relevant to all of the pragmatically-based accounts of language change
sketched above in Section 1 since they are all based on theories of how utterances are processed online,
which overwhelmingly tend to impute to speakers a bias towards enriched interpretations – and hence,
representations – of utterances. Careful experimentation can also substantiate novel ideas and lead to the
discovery of new facts.   30

Consider the current work on referring, which was inspired by Clark (1996) and his informed account of
common ground. Common ground refers to shared knowledge between two people that is constantly being
updated. So, when the two of us refer to *the student*, it is clear that we mean the student that is the most
prominent to us, in the particular context in which we are speaking. The contours of this notion as well as
its nomenclature were developed mostly through experimental paradigms. For example, the phenomenon 35
of *lexical entrainment*, which refers to the way interlocutors attribute names to objects and maintain them
for the length of a conversation (Brennan and Clark 1996) has been studied in some detail: When a speaker
refers to a shoe as a *loafer* in context (to distinguish it, say, from a *sneaker*), the hearer is likely to maintain
that description for the remainder of the exchange, even if it becomes the only shoe in context later. This
indicates that a *conceptual pact* between interlocutors takes precedence over being just informative enough 40
on each occasion.

Follow up work has led to a debate about the source of names for novel objects. That is, while some
work (Metzing and Brennan 2003; Brown-Schmidt 2009) suggests that mutually agreed-upon names for
novel objects appear to be registered along with its source, i.e., the speaker who coined the new name,
others doubt that the speaker is registered in memory along with the newly named object (e.g. see 45
Kronmüller and Barr 2007). Such debates determine the extent to which mindreading abilities are impli-
cated when interlocutors arrive at novel constructions in real-time communication.

As can be seen, experimental pragmatics incorporates existing cognitive and psycholinguistic techni-
ques in order to investigate how human beings interpret utterances. Most importantly, the choice of tools is
determined by the question. While developmental progressions can reveal the extent to which pragmatic 50

readings become prominent with age, reading times can tell us about a listener's ease or difficulty in processing tokens of sentence types. While EEGs can reveal sharp on-line measures for determining how a word is integrated into a sentence, fMRI can reveal what brain regions are recruited when processing an entire sentence. For example, one needs fMRI to predict that brain activity related to mindreading increases (e.g. in the right Temporal Parietal Junction) during the processing of an ironic utterance (e.g. *Tonight we gave a superb performance!*) when compared to literal controls (see Spotorno et al. 2012).

Taken together, this summary shows that experimental pragmatics, much like corpus studies on pragmatic uses (e.g. see Larrivee and Duffley 2014), puts linguistic-pragmatic research on more solid ground. Unlike armchair theorizing, it provides a firm basis for composing and testing theories. Plus, experimental pragmatics uses many tools to carry out the testing. By considering hypotheses generated by research on language change, it would widen its net. In the next section, we consider how experimental pragmatics and historical linguistics overlap and can potentially inform one another.

3 The interface

On some points, experimental pragmatics and language change research have already converged in terms of research questions and findings. One clear example is Traugott's theory of semantic change, set forth in Traugott and Dasher (2002) and elsewhere. This theory argues that *Particularized Conversational Implicatures* (PCIs) made 'on the fly' are gradually conventionalized, becoming *Generalized Conversational Implicatures* (GCIs) and, eventually, coded semantic meanings of expressions. However, Hansen and Waltereit (2006) have shown that the predictions made by Traugott's model are not borne out by historical data. Specifically, the sequence PCI > GCI > coded meaning is, instead of being the standard case of semantic change, a rare exception. This is consistent with findings summarized above on scalar inferences, which have largely debunked default accounts of *Generalized Conversational Implicature* (see also Noveck and Sperber 2007), indicating that, at the very least, there is no viable step that allows for an eventual coded meaning.

Over the course of the past few decades, linguists have proposed metaphor- or metonymy-based accounts of language change. While early work emphasized metaphors as a major mechanism of change, work in the 1990s cast this into doubt, looking for more primitive and testable mechanisms (for example, Bybee et al. 1994), and more recent work has tended to favor metonymy as a mechanism of change (e.g., Traugott and Dasher 2002). Regardless of the merits of each perspective, experimental pragmatics has looked at metaphoric and metonymic meaning shift in a number of different ways and it is worthwhile considering some recent findings in order to better understand their potential roles in language change.

While we indicated that experimental work has shown that metaphors are not exceptional, does this mean that the conventional meanings of metaphoric expressions are suppressed during processing? If so, it would be difficult to see how a word such as *bulldozer* or *pig* would come to describe people. The answer from Experimental Pragmatics is that conventional (or "literal") meanings do remain active for at least several hundred milliseconds after being heard while the addressee arrives at metaphoric meanings, even in slightly developed contexts. For example, Rubio-Fernandez (2007) showed that the final metaphoric word in sentences such as *After six months without going to the barber, John was a lion* prompted quick recognition of associated "superordinate" meanings (*animal*) as well as associated "distinctive features" (*mane*) 400 msecs after hearing the end of the sentence; however, the superordinate associates were no longer as active as metaphor-related meanings 1000 msecs after hearing it (see also De Grauwe et al. 2010; Weiland et al. 2014).

As far as metonymy is concerned, studies show that processing claims call for nuance. While often assumed to be similar to metaphor processing, the profile for metonymy processing differs from both metaphor and approximation (see Bambini et al. 2013). Furthermore, metonymy does not appear to be a one-size-fits-all phenomenon. For example, Schumacher (2013) has shown that "container-for-content alternations" (*What did Heinz drink hastily? He drank the goblet hastily*) prompt EEG profiles with Late

Positivities (a positive going event-related brain potential that occurs 600 msecs or later after critical word onset) while "content-for-container alternations" (*What did Asterix fasten to his belt? He fastened the magic potion to his belt*) did not. Thus, measures that point to the participant making an effort to comprehend metonymy appear to vary as a function of the sort being used.

Taken together, these findings on metaphor and metonymy show that experimentally-based characterizations capture slight variations in processing that are hard to determine with unaided observation. They are also revealing in light of assumptions made by historical linguists. For example, in a textbook on grammaticalization, we find the following statement: "There are great difficulties in defining the notion of economy in anything like rigorous terms. We know very little about what does and does not take 'effort' in producing or interpreting utterances, and still less about what would constitute economy of mental effort on either speaker's or hearer's behalf, although we probably know more about simplicity of perception rather than of production" (Hopper and Traugott 2003: 72). We think that there is room for more optimism here, since experimental pragmatics can actually tell us a lot about effortfulness in both production and processing of phenomena such as metaphor and metonymy, which have been considered to be major mechanisms of the semantic changes observed in grammaticalization. One sees again and again how experimental approaches can provide us with what historical linguistics is looking to find, namely, unexpected, counterintuitive, and objectively measurable facts about processing.

4 Moving forward

There are several ways in which language change and experimental pragmatics can benefit from one another. First, as we have seen, there are numerous hypotheses about the role(s) of pragmatics in language change that linguists have put on the table. These hypotheses can provide questions and data for experimentalists to work on. Meanwhile, experimental pragmatics is well placed for providing a set of methods that could investigate such hypotheses by developing falsifiable predictions to be evaluated in experimental settings. Second, experimental pragmatics can provide concepts that have been established through extensive research. Here, we sketch a few considerations in these two directions.

One way that experimental pragmatics can be useful is to determine how cases that are implicated in well-known pathways of language change are processed by listeners in a given language. Consider the cross-linguistically well-attested pathway from lexical verbs whose meaning is similar to English 'finish' to perfect markers (Bybee et al. 1994). It has been proposed that part of this pathway involves the failure of presupposition accommodation (Grossman and Polis 2014), in which utterances with unaccommodatable presuppositions cannot be processed using regular inferential mechanisms. For example, in English, in which 'finish' was not grammaticalized into a perfect marker, the utterance *John finished dying* would violate the conventional presuppositions of the lexical items involved. Such utterances are argued to induce Eckardt's (2009) APO principle, leading to a novel form-function pairing. Experimental approaches could evaluate such proposals in the following way. Assuming that cross-linguistically recurrent pathways of language change are ultimately based in regularities of processing, it makes sense to look at the ways that, e.g., a well-known source for grammaticalization is processed in languages that have not undergone the relevant grammaticalization pathway. One could develop an EEG experiment on English speakers in which *finish* is used in the sort of contexts that linguists think are implicated in language change. Since the abovementioned theory proposes that utterances with unaccommodatable presuppositions induce 'pragmatic overload,' and as such, reanalysis, it would be possible to look at the ways in which constructed utterances with unsupportable presuppositions are processed. Given the utterance *John finished dying'* we would expect that an EEG experiment would have three possible outcomes:

a. It would require extraordinary resources, compared to a control, e.g. an N400 and a P600[1];

b. It would require fewer resources, e.g. prompting an N400 only;

c. Or – the null hypothesis – it can be readily integrated without effort.

One could also determine whether participants adjust more readily to expressions used in identifiable grammaticalization pathways (that have not yet occurred in a given language) over the course of the experiment compared to other unaccomodatable controls (see Nieuwland and van Berkum 2006, for work that shows how participants adjust to anomalies embedded in a supportive context, e.g., *a yacht talking to a psychologist about his fear of water*). While such results would not in themselves tell us which theory of language change is the right one, they would certainly provide us with objective, measurable information about the way such utterances are processed. This, in turn, would bear directly on the plausibility of different types of pragmatically-based explanations.

Furthermore, distinctions developed in experimental pragmatics could shed light on theories of language change. For example, Noveck and Spotorno (2013) propose that there are two kinds of pragmatic inferences. One requires extra effort on the part of the listener in order to refine the linguistically encoded meaning although the listener could also arrive at a plausible – though weaker – reading without such narrowing. Scalars discussed in Section 2 fit this profile, as do proposals such as that of Bybee et al. regarding 'pragmatic inferencing,' in which inferences can be reanalyzed as the coded meaning of a construction. The other type refers to inferences that rely on a form of coercion on the part of the speaker. In this case, understanding the intended meaning requires listeners to arrive at a narrowed reading, at least in part because the linguistically encoded one is implausible. Metaphor fits this profile and so do scenarios such as 'Avoid Pragmatic Overload,' proposed by Eckardt (2009), according to which utterances with difficult-to-accommodate presuppositions coerce listeners into a form-function remapping. It is possible that only one of these ends up being endemic to language change.

The point to be made here is that both experimental pragmatics and historical linguistics have proposed that different types of inferential mechanisms may be involved in understanding utterances. Historical linguistics can bring to the table an enormous body of data, which can be used to formulate testable predictions, and experimental pragmatics can contribute a wide range of research tools to evaluate hypotheses about processing.

Time will tell whether these particular cases ultimately provide the literature with interesting experiments. Nevertheless, as we outlined, this is a portentous moment in the development of two overlapping literatures. Hopefully, both can take advantage of the opportunity.

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1 An N400 is a negative-going component 400 msec after word onset and indicates that the reader was forced to deal with excessive computational demands compared to what was expected (the classic example for this component is "He spread his warm bread with *socks*"). We are aware that this elementary proposal can be further refined. For example, the P600's particular signature can be revealing as well (see Regel et al. 2014; Spotorno et al. 2013).

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