
The great past tense debate

(a very selective bibliography)

- ***Original data***

  (Cazden, 1968) ; (Kuczaj, 1977)

- ***Original simulation***

  (Rumelhart & McClelland, 1986)

- ***Criticism 1***

  (Pinker & Prince, 1988)

- ***Response 1***

  (Plunkett & Marchman, 1991)

  Responded to criticism of inaccurate data set. Ran parametric studies to determine the conditions under which a network would learn a set of data corresponding to the English past tense. Also used less controversial representations.

- ***Criticism 2: Further distinctions between English regular and irregular verbs***

  (Prasada, Pinkder, & Snyder, 1990)

  In naming task, frequency of the base form affects generation of both regular and irregular past tenses, while frequency of the past tense form affects generation of the irregulars only.

  (Marcus et al., 1992)

  *Proposes **blocking** hypothesis; claims that overregularization of irregular verbs is relatively rare in children’s speech, contrary to predictions of connectionist/competition models*

  (Marcus, 1995)

  Argues that overregularization rate of noun plurals is same as verb past tense, whereas a connectionist model would predict more overreg. for nouns

  (Clashen & Rothweiler, 1992; Marcus et al., 1993)

  Argue that German noun plural in -s and pasr participle in -t are productive despite relatively low type frequency, and must be governed by ‘symbolic rules’.

  (Prasada & Prince, 1993)

  Show that speakers generalize novel verbs to irregular classes by graded analogy to known forms, but that similarity to known froms plays no role in generalization to regular classes.

- ***Responses 2***

  (Daugherty & Seidenberg, 1992; Seidenberg, 1992; Seidenberg & Bruck, 1990)

  These three respond to Prasada et al. account of frequency effects in irregular verbs. Also find consistency effects in regular verbs (with and without irregular neighbors); draw parallels between past tenseproduction and reading of regular and exception forms.

(Plunkett & Marchman, 1993) ; (Marchman, Plunkett, & Goodman, 1997)

Responds, among other things, to Marcus et al. data on overregularization. Argue that shift from rote learning to systematicity is correlated with vocabulary size.

(Bybee, 1995)

Disputes claims of Clahsen and Rothweiler and Marcus et al. (1993) with regard to the actual facts about the relative type and token frequencies of German strong and weak participle s, as well as the German noun plural. Also discusses data from French, English, Arabic, and Hausa.

(Maratsos, 2000)

Disputes (Marcus et al., 1992) claims regarding paucity of overregularization; shows that rates are quite high, and occur with vacillations.

(Nakisa & Hahn, 1996)

Tests generalization properties of 3 types of pattern associator and a dual-route implementation on three different inflection systems: Arabic plurals, German plurals, and English past tense. Finds that the pattern associators outperform the dual-route model.

(Hare, Elman, & Daugherty, 1995)

Demonstrates that a default morphological category can be learned even when that category is not very numerous.

(Plunkett & Nakisa, 1997)

Shows that what is important for generalization in networks s the distribution of forms, not merely their frequency of occurrence.

(Nakisa & Hahn, 1996)

Shows that a pattern associator outperforms a dual-route implmentation in forming the plural of German nouns.

(Hare & Elman, 1995)

Shows that a single mechanism model provides a better account of the historical development of the regular and irregular past tense system in English, from original weak/strong system in Middle English.

- ***Criticism 3: brain imaging and damage***

(Jaeger et al., 1996)

Showed that different brain regions were active during production of regular and irregular past tense forms.

(Ullman et al., 1997)

Describes a pattern of deficits found in anterior aphasics and Parkinson's differ from those of posterior and Alzheimers patients (the former group being worse at regular past tense, and the latter worse at irregulars). Argues that this demonstrates 2 mechanisms are required.

(Gopnik & Crago, 1991)

Described a family (KE) that has multigenerational pattern of language (and other) deficits; reported selective impairment of regular past tense formation and interpreted this as resulting from a genetic mutation.

- ***Response 3:***

(Elman & Hare, 1997; Seidenberg & Hoeffner, 1998)

The first points out a number of methodological problems with the Jaeger et al. paper; the second shows through simulation that the finding differential localization of brain activity while processing regular vs. irregulars (as found by Jaeger et al.) is consistent with a single mechanism model

(Joanisse & Seidenberg, 1999)

Shows that a connectionist model displays the same pattern of deficits described in Ullman et al., 1997, depending on lesion site.

(Vargha-Khadem & Passingham, 1990) ; (Vargha-Khadem, Watkins, Alcock, Fletcher, & Passingham, 1995) ; (Vargha-Khadem et al., 1998)

Various reports by the research and clinical team that have studied the KE family over an extended period of time; show that language deficits are pervasive and that the Gopnik & Crago description of selective loss of regulars is incorrect.

"Rule learning" in infants

❑ *Learning word boundaries*

(Saffran, Aslin, & Newport, 1996)

8-month olds were familiarized to four three-syllable words presented with no breaks between words (e.g., (bidakupadotigolabubidaku. . .); on test, the infants discriminated the "words" from "nonwords" composed of the same syllables permuted differently. Conclude: "Our results raise the intriguing possibility that infants possess experience-dependent mechanisms that may be powerful enough to support not only word segmentation but also the acquisition of other aspects of language. "

(Bates & Elman, 1996)

"Learning Rediscovered." Laudatory Perspectives article in same issue; pointed out similarity between SAN's infant results and statistically-based learning in connectionist models. Suggested that simple learning rules might go farther than previously claimed in providing account of language acquisition.

See also *Science*, 276 (Issue of 23 May 1997), 1177-1181, for letters in response, from: Pesetksy, Wexler, Fromkin; Pinker; Jenkins & Maxam; Clark, Gleitman, & Kroch; Elman & Bates; Saffran, Aslin, & Newport. *The letters are on-line at http://www.sciencemag.org/cgi/content/full/276/5316/1177a?*

Angry response to B&E, 1996, who were charged with hijacking the SAN results for their own purposes. Some letters claimed the SAN results were irrelevant to learning grammar; other writers said the SAN infants were in fact demonstrating an innate domain-specific capacity for language.

❑ *Learning simple grammars (and starting small)*

(Gomez & Gerken, 1999)

(Marcus, Vijayan, Rao, & Vishton, 1999) ; (Marcus, 1999)

Demonstrations of different kinds of rule-like learning by young infants; in Gomez & Gerkin, infants discriminate grammatical legal from illegal sequences (grammar = finite state automaton); in Marcus et al., infants learn to distinguish 3-syllable patterns of the form AAB from ABA. Marcus et al. claim this demonstrates the existence of algebra-like rules in the infants' heads.

(Seidenberg & Elman, 1999a); (Seidenberg & Elman, 1999b) ;

Alternative explanations for the Marcus et al. results. Simulations with SRN that replicate infants' behavior. http://crl.ucsd.edu/~elman/Papers/MVRVsimulation.html

(Elman, 1990)

2 relevant simulations using SRNs. (1) network learns to parse a continuous stream of inputs into word-like units; in (2) network learns a simple grammar, and infers grammatical categories based on distributional evidence

(Elman, 1991)

network learns complex grammar, involving recursion—but only when 'starting small' (cf. below)

(Elman, 1993) ; (Newport, 1990) ; (Turkewitz & Kenny, 1982)

complex grammar can be learned only when a network starts with limited working memory (starts small), similar to Newport's 'Less is More' hypothesis. Cf. also Turkewitz & Kenny's review of other cases where limitations on sensory input early in development are critical to learning.

The problem of generalization

- ***Sparse (but plentiful) input***

  (Marcus, in press) ; (Hadley, 1992) ; (Fodor & Pylyshyn, 1988)

  (Huttenlocher, Haight, Bryk, & Seltzer, 1991) ; (Hart & Risley, 1995) ;

- ***Inseparability of grammar and the lexicon***

  (Bates & Goodman, 1997)

- ***Generalization in neural networks***

  (Elman, 1998)

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