5.1 Introduction: The Creativity of Language Users
In this section Pinker summarizes what linguists think language is and what makes it unique compared to other forms of communication. I won’t talk about it because it doesn’t really pertain to the focus of the article: overregularization, specifically past tense in verbs; although it is an interesting read.

5.2 Overregularization: A Case Study of Grammatical Creativity

Hey, Horton heared a Who.
I finded Renée.
I love cut-upped egg.

- Children do not hear any of these verbs expressed this way from adult speakers.
- Pinker says that there must be a general rule that the child has now acquired and is now using.
- Pinker mentions an experiment, similar to the wug-test in which Jean Berko gets children to show that they have acquired a rule for past tense formation with the following prompt “Here is a man who knows how to rick. He did the same thing yesterday. He…” the correct answer being ricked. Most of the children filled in the blank very eagerly with the correct form.

5.2.1 The Course of Rule Development
- By their two’s, children are starting to use functional morphemes correctly (i.e. –ing, -ed, and –s)
- Before this children use irregulars and regular past participles correctly. They’ve just memorized these forms.
- Eventually they notice that the –ed ending is required for past tense.
- Now they can add –ed to any verb making forms such as “goed” and “holded”
- As they get older the regular forms will block out the overregularized form
- This is called “U-shaped” development

5.2.2 Explaining Rule Development is not so easy
- Pinker points out that there are some problems with the above theory as he has just explained it.
- Both children and adults have and “add –ed” rule but adults do not say “holded.”
- The question is how they get from the child forms to the adult form

He has two guesses:
1) Communication: children get rid of their overregularized forms because they want to communicate better
in some forms however the adult past form is less communicative than the child form, there is a group of verbs that don’t change at all in their past participle (i.e. cut, set, put) making the child form more expressive

2) The overregularized form is not used because adults have not heard other adults say them -This hypothesis seeks to assert that adults wouldn’t be able to pass a wug test. This isn’t true either. New verbs are introduced into the lexicon all the time with no problems in forming them in various tenses.

The problem is not that overregularizations haven’t been heard it is that the irregular past form has been heard.

Because of this, there must be some sort of mechanism in the brain that blocks out the regular form when an irregular form exists.

This mechanism is called the blocking principle.
-When an irregular form exists in the mental dictionary that corresponds to a grammatical rule, the rule is blocked by the irregular form (this rule also applies to words like goose and geese and good and gooder)

The problem in this is that children have to learn the blocking principle. The only way that this is possible is by knowing that the regular form is incorrect. In studies examining adult and child dialogue there is no evidence showing that parents provide this kind of grammatical evidence.

5.3 A Simple Explanation of Overregularization – That Works
Pinker proposes that children learn the correct forms of irregular past participles because they hear their parents say the irregular form. This works, according to Pinker, because overregularization may be a part of Universal Grammar.
-A final assumption in order for overregularization to work has to do with memory. In order for a child (or anyone really) to remember something, they have to be exposed to it multiple times. Children make mistakes because they haven’t heard the irregular form enough to remember it so the default rule for regular past kicks in.. Once they’ve heard it enough times it will take the place of the regular rule.
-Pinker proves this as we read the article by using a verb seldom heard “to shend.” Because we haven’t heard the verb before we say it is “shended.” It is in fact irregular and the correct form is “shent.” This is how verbs with irregular past participles that they’ve never heard are for children. Once they’ve heard it on a regular basis they will be able to recall it better than when they are first learning it.

5.4 Evidence for the Blocking-Plus-Retrieval-Failure Theory

In this section, Pinker outlines 10 facts that support his theory:
1) The mean rate across children for errors they made was only 4.2% and the median 2.5%. The top curve, in the graph below, represents the number of past irregular forms that are correct. The bottom the percentage of past regular forms that are correct. The numbers show that the errors children make are a result of sporadic malfunction not a different system. Even on the same day a child can use both the correct form and the overregularized form in the same day. “Daddy comed and said ‘hey, what are you doing laying down?’ And then a doctor came…”

2) Pinker also found that children overregularized the verbs less often that their parents said more in speech and vice versa.

3) Here Pinker points out the sharp spike in the regular curve saying that it is at this point Adam has acquired the rule. Before this time he was only using forms that he had memorized regular or irregular. When he didn’t remember it was the bare stem that he would use (“Yesterday he walked” and “Yesterday he walk”). Now he has the “add –ed” rule that he can use whether he has remembered the form or not.

4) Pinker wonders where the overregularization errors that children make come from. Are they in place of a bare stem like hold, the correct form held? Pinker gives a statistic showing
that the overregularization errors are in fact taking the place of old errors. Before acquiring
the rule Adam used forms like “he held it” 74% of the time and “he hold it” 26% of the
time. After having acquired the rule (and overregularization) he used forms like “he held it”
89% of the time “he hold it” 9% of the time and “he holded it” 2% of the time. The
overregularized forms are taking the place of the bare stem form not the correct form, which
after overregularization has increased.

5) In a different experiment children are asked to tell whether something is grammatical,
with correct verb forms or not, with overregularization (i.e. does the puppet say something
silly or not). The results showed that children did say more often than not that the
ungrammatical sentences were silly showing that they recognize that the overregularizations
were incorrect.

6) Some psycholinguists have used their children’s own overregularizations when talking to
them to see the reaction. The children reacted negatively showing that they understand that
their forms are not always grammatical.

    Parent: Where’s Mommy?
    Child: Mommy goed to the store.
    Parent: Mommy goed to the store?
    Child: NO! (annoyed) Daddy, I say it that way, not you.

    Child (a different one): You readed some of it too… she readed all the rest.
    Parent: She read the whole thing to you, huh?
    Child: Nu-uh, you read some.
    Parent: Oh, that’s right, yeah. I readed the beginning of it.
    Child: Readed? (annoyed surprise) Read! (pronounced “red”)
    Parent: Oh, yeah, read.
    Child: Will you stop that, Papa?

7) Pinker points out that adults occasionally will make overregularization errors, showing
that the mistakes aren’t the result of a completely different mental grammar.

8) Pinker also points out that there are many verbs that even adults can’t necessarily say for
sure which are correct, the regular or irregular past form. Some examples: dreamed or
dreamt? Dived or dove; leapt or leaped; strided or strode. Here Pinker is showing that one
way language can change is through overregularization.

9) Related to number 8 is historical change in verbs. Pinker gives the statistic that there are
33 verbs that have come through to modern English from old English that all had irregular
past participles. The ones with irregular past tenses still in use occur 137/million
(515/million in present) and the ones with regular past tenses occur 5/million (27/million in
present). According to Pinker the English language behaves just like children do,
regularizing the rarer verbs and keeping the more frequently used verbs with irregular past
participles.
10) In the final piece of evidence he gives, Pinker shows the frequency statistics for verbs in one million words of text. Pinker states that irregular verbs will tend to be highly used. This is just what the results show. The top ten most frequently used verbs are all irregular (be, have, do, say, make, go, take, come, see and get, in that order). The last thousand are all rarely used regular verbs, except for a bunch that have irregular stems: bethink, overdrive, unbend, unwind etc) For those the frequently used stem blocks the regular –ed ending.

5.5 Past Tense Overregularization and Connectionist Modeling

In this section Pinker discusses alternatives to the simple “add –ed” rule.

His first alternative is that children use analogy to form past tenses that they don’t know. He suggests that they might say “holded” because it sounds like mould, scold and fold, all of which are regular. They also might use bits and pieces of other verbs they know. Ex. singed might be formed because they know verbs like sipped, banged, rimmed and rigged. It was not clear how this would really work but there were no real alternatives to challenge it.

Computer modeling introduced what is known as parallel distributed processing (PDP), connectionism, or artificial neural networks. One example of a PDP (pattern associator) was devised by David Rumelhart and James McClelland. It was able to acquire many regular and irregular verbs and could conjugate many verbs correctly that it hadn’t been trained on before.

How it works:
- It has many inputs, many outputs and various weighted links that can be modified between all the inputs and outputs.
- A given verb stem turns on a subset of the inputs.
- This sends a signal through all the various inputs to their given outputs.
- The outputs add up the amount of inputs they receive and if it exceeds a certain threshold the output turns on.
- The output form is what was most compatible with the given inputs.

In the learning phase the form given by the associator was compared by a “teacher” and the weights between the various inputs and outputs would be adjusted as needed.

Why it is interesting:
The associator is interesting because Rumelhart and McClelland were able to get it to overregularize. Basically the network was bombarded by verbs that showed the regular pattern just like children, strengthening the links between the stem units and the units that defined the –ed ending.

5.5.1 Testing Rules Versus Analogies

In order to figure out whether the errors children make are from over-application of a mental rule or the effect of analogizing from the patterns of regular verbs Pinker examines some of the following data:
One assumption that Pinker looks at is the assumption that overregularization is the result of an influx of verbs. The data however shows just the opposite. The proportion of regular and irregular verbs used towards children was constant from age 2 to age 5. The so-called “vocabulary spurt” also does not coincide with overregularization. The spurt occurs mid to late 1’s and overregularization mid to late 2’s.

Second, Pinker examined whether the amount of similar sounding verbs used by the child affected whether they overregularized (like “holded” with folded). Upon examination Pinker found no real correlation between the two.

Third, Pinker examined whether the grammatical status of a verb affects whether a child overregularized it or not.

--The example Pinker gives is a study done by Stromswold (1990) on auxiliaries. Pinker is interested in whether children overregularize verbs like do and have that are both normal and auxiliary verbs in situations where they act as auxiliaries and do not follow the rules of normal verbs.

-Children do in fact make grammatical distinctions and will only overregularize when the verbs are used in active sentences and not as auxiliaries. Ex. They would say things like: “Look what he did” but never “What did he make” meaning that children do not overregularize on the basis of sound but rather on grammatical function.

--Another example Pinker gives is verbs based on nouns. These are always regular (ex. grandstanded not grandstood).

- In tests with children, the children regularized the verbs that they perceived to come from nouns much more often even when they sounded like irregulars (ex. to fly meaning “to cover a piece of paper with flies”)

While children do not use sound analogy when they form regular past participles they do analogize to other irregulars when remembering irregular past participles, just like the pattern associator. Pinker found that the greater the number of rhyming irregular family members (i.e. drink-drank, sink-sank, and grow-grew and know-knew) the less likely the child was likely to overregularize. Sometimes children overregularize irregulars creating knew irregular past forms such as wipe-wope (like write-wrote).

- Based on this Pinker states that while connectionist analogizing does not explain the memory system for regular verbs it is a fairly accurate model of how irregular verb forms may be stored.

5.6 Conclusions
In this final section Pinker makes 9 observations that can be concluded from studying overregularization. I won’t talk about them specifically but they do show how a small mistake, like overregularization, relates to many other ideas and areas of linguistics.