

# The Chameleon-like Nature of Evaluative Adjectives

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This is an experimental study of the semantics of the construction *NP was (not) Adj to VP* where *Adj* is an evaluative adjective such as *stupid*. We show that in the simple past tense this construction is predominantly **FACTIVE** for most people but **IMPLICATIVE** for some. We also demonstrate that the interpretations are sensitive to preconceptions about how suitable the adjective is as a characterization of the event described by the infinitival clause. This **CONSONANCE/DISSONANCE** effect gives the construction its chameleon-like characteristics.

*Keywords:* evaluative adjectives, presupposition, entailment, factive, implicative, variation, Amazon Mechanical Turk, crowdsourcing

## 1 Introduction

What an expression of a language implies is intimately related to what it means and also to what information speakers use it to convey. This paper studies implications communicated by uses of certain expressions, to investigate what these expressions mean. Concretely, we concentrate on implications of certain predicative adjectives, focusing on implications about the infinitival clauses in sentences such as (1).

- (1) The Raiders were stupid to draft Russell.

The semantics and the syntax of this construction have been studied in some detail by Norrick (1978), Stowell (1991), Barker (2002), Hacquard (2005), Oshima (2009), Kertz (2010), Landau (2010), and Fábregas et al. (2012). These studies all treat evaluative adjectives as factive in this construction, presupposing (and hence implying) in sentence (1) that the Raiders drafted Russell. Although the corresponding negative constructions are rarely mentioned, implicitly these studies hold that (2) also presupposes that the Raiders drafted Russell.

- (2) The Raiders weren't stupid to draft Russell.

The authors gratefully acknowledge the support of Stanford University and of the Defense Advanced Research Projects Agency (DARPA) Machine Reading Program under Air Force Research Laboratory (AFRL) prime contract no. FA8750-09-C-0181. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the view of Stanford, DARPA, AFRL, or the US government.

Thanks to Kenny Moran, Stuart Melton, and Dasha Popova, our Summer 2013 research assistants, for their help in the design of the experiment and in the analysis of the results. Special thanks to Daniel Lassiter for getting us up to speed on Amazon Mechanical Turk.

We are also grateful for the feedback we have received from EISS-10 reviewers and the audiences who heard earlier versions of this paper at Paris, Edinburgh, Aberdeen, Dagstuhl, Boulder, Tübingen, Brandeis, and Stanford.

These two sentences are each taken to have a further implication: (1) implying (3a), and (2) implying (3b).

- (3) a. The Raiders drafting Russell was stupid.  
 b. The Raiders drafting Russell was not stupid.

The intuitions backing this traditional analysis can be summarized as in Table 1.

**Table 1**

SENTENCE	FACTIVE
NP was Adj to VP	NP VPed NP VPing was Adj
NP wasn't Adj to VP	NP VPed NP VPing wasn't Adj

The implication that *NP VPed*, being shared by the affirmative and the negative sentence, is the obvious candidate for what the two sentences presuppose on this analysis. Moreover, what differs between the affirmative and the negative sentences' implications is whether *NP VPing* was or wasn't *Adj*. This makes the proposition that *NP VPing was*

*Adj* the obvious candidate for what the affirmative sentence asserts and the negative sentence denies. Indeed, that sums up the traditional analysis of what these sentences mean.

When one looks at the WWW to examine this construction's usage, however, the picture appears to be more complicated. Affirmative examples do seem to uniformly imply that the event mentioned in the infinitival clause happened. But cases with a negated matrix clause present a distinctly mixed picture. On the one hand, numerous negative examples like those in (4) follow the factive pattern just described.

- (4) a. Mandela was not fortunate to meet all of these people but rather they were fortunate to meet Mandela.  
 b. Piers Morgan was not brave to take on Brett Lee: he was idiotic and he was lucky that he did not get seriously hurt, says Peter Miller on Cricket Stats.  
 c. On July 1, 1776, Jefferson presented his Declaration of Independence while Dickinson continued to rally that it wasn't quite time. And when you think about it, he wasn't stupid to think so. Great Britain had the largest, strongest Navy in the world and, at the time, were squatting right outside the Island of Manhattan, poised to attack.

On the other hand, there are many examples that conflict with the factive pattern, such as those in (5).

- (5) a. I wasn't fortunate to live extremely close to my Mom and Dad for most of my adult life. The closest was when I was in Denver and they were in Garden City, KS.  
 b. This is my first trip to Italy, so I was not brave to venture out alone.  
 c. Now I knew someone was in the junkyard and the cold wind was carrying the cries. I wasn't stupid to go stumbling through the junkyard in the dark and get hurt.

In these examples, the text surrounding the adjective's clause makes it clear that the writer means to imply that the event mentioned in the VP did *not* take place. The negated adjective characterizes a possible event that did not happen: not stumbling through the junkyard was not stupid. Such examples are hardly rare; these three come from the first two pages of a web search on *wasn't Adj to*. We have found, though, that some readers feel such examples are not fully acceptable—that their authors must have intended the adjective to be followed by *enough*. We

take up this reaction in due course. The pattern of implications from this usage is summarized in Table 2.

None of the tabulated implications of this usage are common to affirmative and negative sentences. Nevertheless, this use of the construction does seem to have a presupposition: that the affirmative sentence is true if and only if *NP VPed*, and the negative sentence is true if and only if *NP didn't VP*. This biconditional presupposition could also be formulated along the lines of (6).

**Table 2**

SENTENCE	IMPLICATIVE
NP was Adj to VP	NP VPed NP VPing was Adj
NP wasn't Adj to VP	NP didn't VP NP not VPing wasn't Adj

(6) For NP to VP would be Adj and for NP not to VP would not be Adj.

All examples we have found attesting to this pattern contain an evaluative adjective, like *stupid*, *brave*, and *fortunate*, as opposed to emotive adjectives such as *glad*, *sad*, or *annoyed*.<sup>1</sup>

Our discussion of implicative interpretations here and for the remainder of this paper pertains specifically to the *NP was (not) Adj to VP* construction with evaluative adjectives. For conciseness we sometimes refer in what follows to interpretations such as those in (4) as **F** interpretations and those in (5) as **I** interpretations. The ENTENTEN-2.0 corpus (Lexical Computing Ltd 2012) contains a similar mix of examples of *NP was not Adj to VP*, some, such as (7), having the **F** interpretation and others, such as (8), the **I** interpretation.

(7) a. I am not saying that I was not stupid to have trusted someone because they were family but it doesn't mean that they should get away with it.  
b. But what would have happened if she was not fortunate to be married to Joe?

(8) a. Srinivasan has said that his telephone was hacked into and that he was not stupid to send such derogatory messages.  
b. I was not fortunate to be born with long and beautiful eyelashes like many women.

The **F** and the **I** interpretation of a negative sentence both imply that something happened. Both also imply that what happened was not *Adj*. The pivotal difference between the interpretations is *what* they imply happened: **F** that *NP VPed* and **I** that *NP did not VP*. Of the first 60 examples of *NP be not stupid to VP* in the ENTENTEN-2.0 corpus, approximately two fifths are type **F** uses, another two fifths are type **I**, and one fifth could be taken either way.

<sup>1</sup>To avert potential misunderstandings, we note that the construction exemplified by

(i) It was stupid of John to wash the car.

seems to differ in its range of usage from the similar seeming construction of (ii), which this paper focuses on.

(ii) John was stupid to wash the car.

Although Stowell (1991) suggests that (i) is syntactically derived from (ii), we have not found on the WWW any negative sentences of the form *It was not Adj of NP to VP* taking the second, implicative type of interpretation that the negative *NP was not Adj to VP* sometimes has. In every clear case we have found, the construction with *of NP* is intended to have the factive interpretation. For example:

(iii) a. It was not stupid of you to love someone. It was stupid of that person not to receive your love.  
b. It was not brave of me to start this blog.

## 2 Interpreting Apparently Conflicting Data

How ought conflicting observations as are found in this construction to be treated? Possible responses include the following:

1. Treat examples like those in (4) and (7) as the only normative uses of the language in question, and regard apparent counterexamples, like those in (5) and (8), as aberrant.
2. Offer an explanation of the communicative success of cases like those in (5) and (8), while treating only the examples in (4) and (7) as normative uses of the language in question.
3. Treat cases like those in (4) and (7) as exemplifying one normative use of the language, and cases like those in (5) and (8) as exemplifying another normative use of the language.

Put differently, how can one determine what the scientifically appropriate response to a particular conflict is? Are apparent counterexamples to a linguistic generalization misuses of the language, comprehensible errors on the part of their producers, evidence of an alternative linguistically legitimated use, or possibly something else? The first response does not seem to meet the standard of scientific responsibility in this instance, although simple errors of usage do sometimes occur through ignorance or inadvertence.

The second response, on the other hand, is *prima facie* plausible. Some English speakers do feel the sentences in (5) and (8) deviate from their language's norms but not so far that the author's intent gets obscured by his sloppiness in usage. Distinguishing between an intelligible abuse of a language and a different speaker's fully normative use can be a complex problem. This paper deals with it by means we now begin to describe.

Our approach employs experimental methods to decide between the three approaches above for the case of evaluative adjectives in the construction under study here. In section 3 we formulate three hypotheses regarding the normative status in English of **F** and **I** uses and spell out a way to test them in section 4. In sections 5, 6, and 7, we present our analysis of the results and argue that, while response 2 above may at times be the correct one, evidence strongly favors response 3 regarding observed uses of the construction under study having the **I** pattern of implications.

Closer examination of the **I** type examples in (5) and (8) reveals that for many, the writer seems predisposed to believe that *for NP to VP* would be *Adj*. Sincere assertion of a negative first-person statement to express its **I** interpretation commits the writer to this belief. For example, (5c) could only be claimed by a writer who believed that for him to go stumbling through the junkyard in the dark and get hurt would be stupid.

Similarly, the writer of (5a) must believe that for him to live extremely close to his mom and dad for most of his adult life would be fortunate. Indeed, even to a reader who thinks living so close would not be fortunate, the writer's next sentence makes clear that he thinks it would. And for non-first-person sentences like (8a), the writer presents Srinivasan as assuming that for him to send such derogatory messages would be stupid. A related observation is that many type **I** sentences on the WWW and in corpora with an *Adj* that is undesirable have an "of course" flavor, as though the author regards the possible event not occurring as perfectly natural because its occurrence would have been *Adj* rather than *not Adj*, as in (5c) and (8a). And many type **I** sentences in which *Adj* is desirable have a "regrettably" flavor, as though the author regards the possible event not occurring as sad because its occurrence would have been *Adj* rather than *not Adj*, as in (5a) and (8b).

In many cases, moreover, it seems probable that not only the writer but also the audience of readers is predisposed to grant that *for NP to VP* would be *Adj*, as in (5c), for example. When would it not be stupid for a person to go stumbling through the junkyard in the dark and get hurt? And even readers who do not themselves subscribe to assumptions such as that it requires bravery to venture out alone during one's first time in a foreign country, or for a woman to be born with long and beautiful eyelashes would be fortunate, readily recognize the cultural influence of such beliefs. Might culturally entrenched assumptions such as these nudge readers toward the **I** interpretation of sentences (5) and (8)?

We term a statement that *NP was (not) Adj to VP*, where *Adj* is evaluative, **CONSONANT** in a context where there is a predisposition to assume or grant that *for NP to VP* would be *Adj*. This property, which we have just seen in action, has an opposite. Statements of the form under study are **DISSONANT** in contexts where a predisposition exists to assume or grant that *for NP to VP* would not be *Adj*.<sup>2</sup> Consonance exists along a spectrum, from cases where there is a widespread assumption that *for NP to VP* would be *Adj*, through ones where readers widely believe that many people assume this even though they themselves do not, to cases in which the reader grants the proposition solely because the writer makes clear that he or she believes it. Dissonance has a similar spectrum. Just as we may see a tendency toward **I** interpretations of consonant negative sentences, there might be a tendency toward **F** interpretations of dissonant negative sentences, as illustrated in (9).

- (9) They were not foolish to question what was so blatantly a discrimination against British citizens who have paid into the NHS all their life but were denied care.

The **CONSONANCE/DISSONANCE** spectrum is of course relevant only in situations where the truth of the infinitival clause is not part of the 'common ground' in the discourse. In our judgement (9) could be used in a situation where the addressee is not supposed to know whether the protagonists have questioned some decision, leaving her the choice of an **F** or **I** interpretation. That is not the case with examples such as (4a), where the interlocutors evidently are in agreement that Mandela and some group of people had met. The point of (4a) appears to be to contradict a previous suggestion that Mandela was fortunate to meet these people. It is an example of what Horn (1985) calls **METALINGUISTIC NEGATION**, a disagreement about words.

If these tendencies are strong enough, they might constitute a useful probe for testing whether use of the *NP was (not) Adj to VP* construction to express the **I** interpretation is a deviation from correct usage whose communicative intent can nevertheless often be understood, or instead is a normatively correct usage, albeit a different one from the construction's use to express the **F** interpretation. A pilot experiment to assess their strength was run with sentences like *Robin was not clever to choose the best/worst piece* and *Kim was not stupid to save/waste money*.<sup>3</sup> Subjects were asked whether Robin chose the named piece or whether Kim saved/wasted money, and were also given the option of responding that they could not decide. The results are shown in Table 3 on the next page.

Encouragingly, the consonant sentences, which appear first and last in the table, are more likely to receive the **I** interpretation, while the dissonant sentences in the middle are even more

<sup>2</sup>Wason and Reich (1979) describe a related type of mismatch between context and a sentence's semantic content, which they term "non-pragmatic."

<sup>3</sup>This experiment was run with filler items from a study about *lucky*. Overall it involved 100 "Turkers" and 20 questions per subject.

**Table 3**

NP was not clever/stupid to VP

STIMULUS	ADJECTIVE-COMPLEMENT RELATION	ANSWERS	CHOICE	%
R. was not clever to choose the best piece	to choose the best piece is clever CONSONANT	R. chose the best piece	F	25
		<b>R. did not choose the best piece</b>	<b>I</b>	<b>64.2</b>
		undecided		10.7
R. was not clever to choose the worst piece	to choose the worst piece is not clever DISSONANT	<b>R. chose the worst piece</b>	<b>F</b>	<b>80</b>
		R. did not choose the worst piece	I	10
		undecided		10
K. was not stupid to save money	to save money is not stupid DISSONANT	<b>K. saved money</b>	<b>F</b>	<b>78.6</b>
		K. did not save money	I	14.2
		undecided		7.1
K. was not stupid to waste money	to waste money is stupid CONSONANT	K. wasted money	F	28.6
		<b>K. did not waste money</b>	<b>I</b>	<b>66.7</b>
		undecided		4.8

likely to receive the **F** interpretation. A small minority of respondents were unable to decide which interpretation was intended, usually smaller than committed to either the **I** or the **F** interpretation. These initial results do not settle whether respondents choosing the **I** interpretation for consonant sentences were making allowance for the writer's misuse of English, and attributing a plausible meaning to what was written even though that meaning is contrary to the norms of English. Note that a significant minority of respondents chose the **F** interpretation even for consonant sentences. Nor do the results settle whether respondents choosing the **F** interpretation were always following their own language norms, rather than some of them attributing a less surprising interpretation to a writer's dissonant sentence than they themselves would use the sentence to express. Again note that a non-negligible minority of respondents chose the **I** interpretation of the dissonant sentences. However, the results do demonstrate the existence of strong effects, indicating that CONSONANCE/DISSONANCE can be useful in a larger, more carefully controlled experiment to decide between possible explanations of the data.

An additional useful fact is that sentences can be neither consonant nor dissonant. As we have seen, consonance is a stronger or weaker predisposition to assume that *for NP to VP* would be *Adj*. Dissonance is a stronger or weaker predisposition to assume that *for NP to VP* would not be *Adj*. These opposites are both absent from neutral sentences, for which neither disposition is present in any significant degree. Examples include *Robin was not clever/stupid to take the middle piece* and *Kim was not clever/stupid to count money*. Neutral examples play an important role along with consonant and dissonant sentences in experiments to test the hypotheses we now lay out.

### 3 Predictions of Three Hypotheses

In order to choose between reactions 2 and 3 (see the beginning of section 2) to unexpected uses observed on the WWW and in corpora, we consider three hypotheses regarding the norms of English.

**Hypothesis A:** Evaluative adjectives can only be used factively in this construction.

This is the received view among linguists and, if correct, calls for a satisfactory explanation of the robustness of communicatively successful **I** uses.

**Hypothesis B:** Evaluative adjectives can only be used implicatively in this construction.

We introduce this for formal completeness although we are not aware of any linguist who holds this view. It nevertheless merits testing along with Hypothesis A.

**Hypothesis C:** Two norms exist for interpreting evaluative adjectives in this construction; one permits only factive use, the other only implicative use.

It bears remembering that norms are not inviolable laws. People who follow them still violate them from time to time—accidentally, unwittingly (when something gets in the way of seeing what the norm requires), and even deliberately (for effect). So one would not expect language use to conform exceptionlessly to the norm(s) on any of these hypotheses.

The most direct way to test Hypotheses A, B, and C would be to determine, when one of these adjectives is used in the construction, which interpretation the speaker or writer meant to convey. One might, for example, ask which implications in Table 1 and Table 2 the person intended. But this is not feasible as we do not have access to the authors; so we resort to other methods for testing the hypotheses. In an ideal world, one might be able to induce speakers to use evaluative adjectives in the construction without biasing speakers toward communicating any particular one of the interpretations under study. Such an experiment, though it faces obvious difficulties, is worth trying to design and carry out. At least for now, however, we have pursued an easier if more circuitous path that begins with testing readers' interpretations of sentences whose writers' intentions are unknown apart from clues in the sentences themselves. This provides useful information about the ways in which English speakers understand the construction under study, and opens the door to relatively unperturbed investigation of whether a reader would use the construction in the same way as the writer did in the circumstances at hand.

To determine how results of our experiment bear on the Hypotheses, some understanding is needed of the mechanism underlying the CONSONANCE/DISSONANCE effect in sentence interpretation. Could the linguistic norm for evaluative adjectives permit or even require consonant sentences to be used to communicate the implications in Table 2, and dissonant sentences to communicate those in Table 1? Does the norm instead require these adjectives to be used to communicate the implications in Table 1; but readers interpret apparent violations of this norm as if the writer meant to communicate the **I** implications in Table 2 when those are 'more sensible' (i.e. in consonant contexts)?<sup>4</sup>

We call the former possibility the SEMANTIC explanation, and the latter the PRACTICAL explanation. These alternatives amount to auxiliary hypotheses, necessary to link Hypotheses A, B, and C to actual language usage as sampled by our experiment. As such, they are evaluated in the experiment along with the primary hypotheses: A, B, and C. We note that the SEMANTIC and the PRACTICAL explanations are not mutually exclusive. It could be, and perhaps is, the case that evaluative adjectives' meanings favor the type **I** interpretation to some extent in consonant contexts and the type **F** interpretation to a similar extent in dissonant contexts, and at the same time true that readers tend to interpret writers' failures at following the language's norm 'charitably', giving sentences a more rather than less 'sensible' reading. We return to these questions after describing our experiment and its results.

We chose 19 adjectives that were classified as evaluative factives by Norrick (1978), and coupled them, affirmative and negated, with an appropriate infinitival phrase, so as to get one

<sup>4</sup>If Hypothesis B is correct, uses of evaluatives in dissonant contexts to communicate the **F** implications in Table 1 successfully would need a similar explanation.

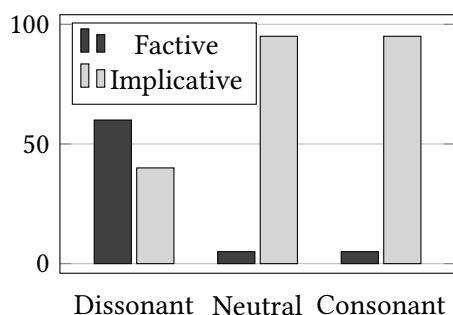
consonant, one neutral, and one dissonant sentence, as exemplified in (10).

- (10) a. CONSONANT: Tom was not foolish to wear a clown costume to the interview.  
 b. NEUTRAL: Harry was not foolish to wear this outfit to the interview.  
 c. DISSONANT: Tom was not foolish to wear a suit to the interview.

If all evaluative adjectives were factive for all speakers we would expect that, in the case of negative statements, judgments of nearly all subjects in Dissonant and Neutral contexts would be that the event did happen. But in a Consonant context there could well be fewer **F** interpretations and an increased number of **I** interpretations. If Hypothesis A is correct, the experiment should have an outcome similar to what is depicted in Figure 1.

**Figure 2**

Hypothesis B: All the adjectives are implicative



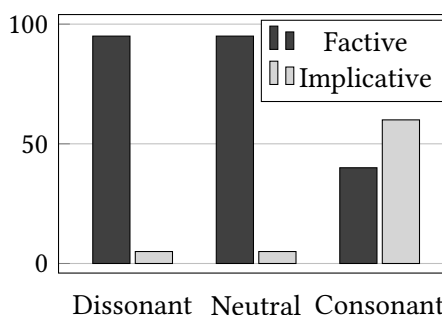
And if there are actually two groups of speakers, one group for whom the normative use of evaluative adjectives is factive in the *NP was Adj to VP* construction and another group for whom the normative use is implicative, both CONSONANCE and DISSONANCE effects could be seen. The distribution of responses to negative stimuli in the Neutral case would give us an estimate of the relative size of the two groups. If Hypothesis C is correct, the experiment should have an outcome similar to what is depicted in Figure 3 in case there were as many factive subjects as implicative ones.

Because of the CONSONANCE/DISSONANCE effect, a number of implicative speakers would tend to give a factive interpretation in the dissonant context and, similarly, a number of factive speakers would tend to give an implicative interpretation in the consonant case. These tendencies would be produced by the effect regardless of which explanation of it is actually at work, the SEMANTIC or the PRACTICAL explanation.<sup>5</sup>

<sup>5</sup>In our experiment each reader saw only 20 out of 114 evaluative sentences so as to avoid undesired priming or set effects.

**Figure 1**

Hypothesis A: All the adjectives are factive

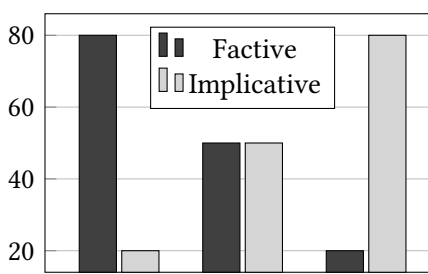


Dissonant Neutral Consonant

If all evaluative adjectives were implicative for all speakers, we would expect that, in the case of negative statements, the judgments of nearly all subjects in Consonant and Neutral contexts would be that the event did not happen. But in a Dissonant context there could well be more **F** interpretations and fewer **I** interpretations. If Hypothesis B is correct, the experiment should yield a result similar to Figure 2.

**Figure 3**

Hypothesis C: There are two norms



Dissonant Neutral Consonant

similar to what is depicted in Figure 3 in case there were as many factive subjects as implicative ones.



#### 4 Experiments

We ran this study on Amazon Mechanical Turk in March of 2013 with a larger group of subjects. We had 206 participants ranging in age from 18 years (1) to more than 60 years (3), about half of them (108) between ages 19 and 30. All participants identified themselves as native speakers of English. 100 were women.

Each subject was asked to respond to 30 test sentences randomly chosen from blocks of six sentences such as shown in Table 4.

**Table 4**

Stimuli for the adjective *smart*

Paul was smart to take the best piece.	CONSONANT
Paul wasn't smart to take the best piece.	CONSONANT
Jessica was smart to take the middle piece.	NEUTRAL
Sally wasn't smart to take the middle piece.	NEUTRAL
Audrey was smart to take the worst piece.	DISSONANT
The man wasn't smart to take the worst piece.	DISSONANT

Each subject saw at most one sentence from a single block. There were 19 adjective blocks, each comprising six sentences. The adjectives were: *arrogant, brave, careless, cruel, evil, foolish, fortunate, heroic, humble, lucky, mean, nice, polite, rude, sensible, smart, stupid, sweet, and wise*. We tried to make four of the six sentences in each block clearly biased, with two CONSONANT and two DISSONANT; the remaining pair were supposed to be NEUTRAL. Each pair comprised the affirmative and the negative version of a sentence. The examples were all in simple past tense; the idiomatic “probably not” sense that two of the adjectives, *fortunate* and *lucky*, sometimes have in the future tense, see Karttunen (2013), was not part of this experiment.

In the experiment, subjects were presented with 30 web pages consisting of a sentence and two possible interpretations of what the author might have thought. Did the author believe that the infinitival clause was true or the opposite? Figure 4 is an example of one such page. To move on, the subject had to click one of the three radio buttons: **A**, **B**, or **Cannot decide**.<sup>6</sup> The order of the **A** and **B** buttons on the page and their association with a positive or a negative answer were randomly assigned for each page.<sup>7</sup>

Instructions for the experiment showed subjects the three examples in (11), where it is clear for each sentence which answer is right, along with an explanation of why the answer is correct.

- (11) a. John managed to stop the car.  
 b. Linda forgot to call her mother.  
 c. Fred was determined to retire at the end of the year.

The author of (11a) clearly believes that John stopped the car in spite of some difficulty. The author of (11b) must think that Linda did not call her mother although she had intended to do so. In the case of (11c) the correct answer is *Cannot decide* because (11c) does not indicate

<sup>6</sup>In section 5 we call the **Cannot decide** responses **Either**.

<sup>7</sup>Random assignment and ordering may have been a mistake. Some participants complained in their post-experiment comments that the lack of consistency was confusing and had caused them to make errors, selecting **A** when in hindsight they should have selected **B**, or vice versa. We suspect that the two types of errors resulting from unintended clicks most likely canceled each other out and did not significantly bias the outcome.

**Figure 4**  
Sample stimulus page

**Statement:** Paul wasn't smart to take the best piece.

**Question:** Does the author believe A or B?

**A:** Paul did take the best piece.

**B:** Paul didn't take the best piece.

Choose one answer based only on the given sentence.

- A
- B
- Cannot decide

whether the author has any belief about whether Fred in fact retired or didn't retire at the end of the year.

In the experiment, we tried to conceal as best we could what the experiment was about. Of the 30 sentences each participant was presented with, one third were randomly selected distractors containing an adjective we were not studying such as *afraid*, *eager*, *hesitant*, *outraged* and *surprised*, or sentences with no adjective at all like those in (11). We maintained a 50/50 balance of affirmative and negative sentences to obscure the fact that responses to negative stimuli were of principal interest to us.

We selected half-a-dozen control sentences similar to (11a) and (11b), prepared to exclude any participant who got more than two of the "gold standard" answers wrong because it would indicate the subject either didn't know English well or was not paying enough attention to the task. Only three subjects were excluded from analysis for failing this test.<sup>8</sup>

The experiment can be run from a browser at the following URL:  
[http://web.stanford.edu/group/csli\\_lnr/eiss-10-AMT/Website/Experiment.html](http://web.stanford.edu/group/csli_lnr/eiss-10-AMT/Website/Experiment.html)<sup>9</sup>

## 5 Results

Figure 5 presents an overview, aggregating the results for negative sentences containing all nineteen evaluative adjectives in the study. Overall, we see that:

1. There are more **F** interpretations than **I** ones in all three contexts.
2. There is a strong, clear CONSONANCE/DISSONANCE effect. The decrease in **F** and matching increase in **I** interpretations from DISSONANT through NEUTRAL to CONSONANT contexts

<sup>8</sup>We nevertheless paid them the same fee as the others: \$1 for the completed task, more than the prevailing rate at the time, to maintain a good reputation as an employer in the *Turker Nation* community (<http://www.turkernation.com/>). As a result, data collection for the experiment was completed very quickly. All tasks were completed in less than two hours.

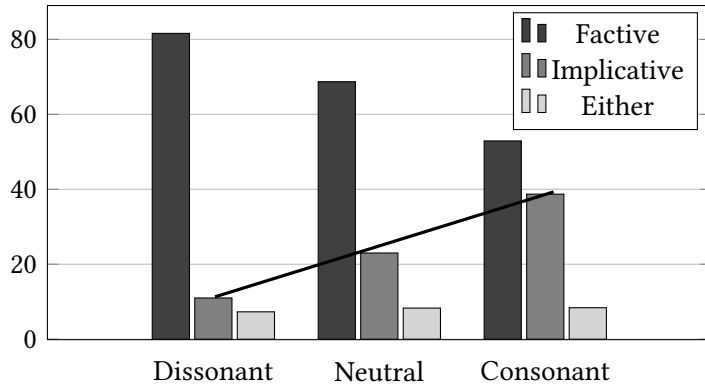
<sup>9</sup>This page operates in 'debug' mode; everything proceeds like the actual experiment until the very end. At that point, the trial user's data are displayed on the screen for her to verify that everything worked correctly. In the actual experiment on AMT, a subject's data would be sent to the experimenter and would not be seen by the subject. In debug mode nothing is saved or sent anywhere.

is nearly linear. (Adjusted  $R^2 = 0.99$  for the slope of the **I** interpretations.)<sup>10</sup>

3. There are 23.0% **I** interpretations and 68.7% **F** interpretations in the neutral condition.
4. Even in the **DISSONANT** condition, there are 11% **I** interpretations. A t-test, comparing these to the **Either** responses (subjects selecting the *Cannot decide* button) showed that these two responses cannot be assimilated.

**Figure 5**

Results: Percentage of Factive, Implicative, and Either choices for *NP was not Adj to VP*.



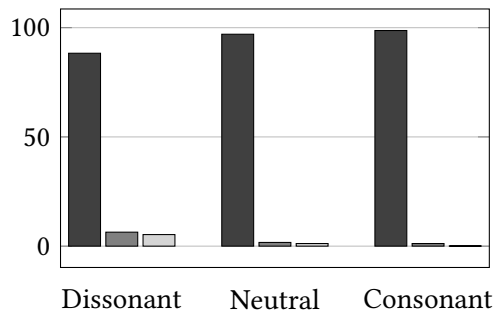
A useful baseline for interpreting this pattern of choices is subjects' responses to "gold standard" sentences with negation, like *Linda was not surprised to find a key in the lock*, *Bill was not able to respond to the question*, and *Linda was not eager to go to the party*. Readers interpreted such sentences as predicted all but 4.9% of the time.<sup>11</sup> For negated evaluative adjectives, no response received close to 95% of responses.

Responses to affirmative evaluative adjectives were comparatively uniform (see Figure 6). Readers interpreted affirmative evaluatives 97% of the time as the event happening, except in dissonant contexts, where 5% or 6% of respondents couldn't tell whether the event happened or thought it did not.<sup>12</sup>

These experimental results are clearly consistent with hypothesis C. Using interpretations in neutral contexts as an estimate of the relative sizes of the group of **F** speakers and the group of **I** speakers yields a ratio of

**Figure 6**

Results: Percentage of Positive, Negative, and Either choices for *NP was Adj to VP*.



<sup>10</sup>When constructing examples, we aimed at making affirmative **DISSONANT** ones clearly unexpected and affirmative **CONSONANT** ones clearly expected. The linearity of this shift measures how well we succeeded, together with how successful we were in constructing examples that were indeed judged to be neutral. Quite a bit of variation from adjective to adjective can be expected (see section 6.1 for discussion).

<sup>11</sup>Predicted responses to the listed sentences were: Linda found a key in the lock, Bill did not respond to the question, and Linda either might or might not have gone to the party.

<sup>12</sup>Affirmative examples with the adjectives *fortunate* and *lucky* were not presented in this study, so are not included in Table 6. In previous studies, affirmative past tense sentences with these adjectives were consistently found to imply that *NP VPed*.

about three **F** speakers for each **I** speaker.<sup>13</sup> But were the sentences that we constructed and classified as neutral understood as neutral by the subjects? Subjects' responses to them lie nearly on a straight line between their responses to dissonant sentences and responses to consonant ones, which suggests that the sentences we constructed to be neutral probably are on the whole neither significantly consonant nor dissonant.<sup>14</sup> Readers can judge for themselves how genuinely neutral the sentences we tested are by examining these sentences at the following URL: [http://web.stanford.edu/group/csli\\_lnr/eiss-10-AMT/Website/input\\_sets.js](http://web.stanford.edu/group/csli_lnr/eiss-10-AMT/Website/input_sets.js)<sup>15</sup>

To the extent that the sentences are in fact neutral, the results of the experiment suggest that Hypothesis A and Hypothesis B should both be rejected. Neither hypothesis provides a basis for predicting that neutral sentences will deviate from the base response that it predicts: **F** for Hypothesis A and **I** for Hypothesis B.

In sum, a large enough group of readers provided enough responses to a wide enough range of adjectives for the experiment to yield reliable information about how readers interpret sentences written by unknown people. We conclude that (a) affirmative evaluative adjectives are consistently interpreted with the implications shared by factive and implicative interpretations. All negated sentences were more likely to receive an *Either* response than the corresponding affirmative sentences were, negated evaluative adjectives as much as twice as likely. Nevertheless, (b) interpretations of negated evaluative adjectives pattern like a mixture of factive readings and implicative readings, in roughly a three-to-one proportion.

## 6 Discussion

We discuss some of the variation in data from the experiment before turning to the question of whether readers who responded with the implicative interpretation of a negated evaluative might be placing a plausible interpretation on a sentence they would not use in the way that the writer did.

### 6.1 Variation

An obvious question is how consistent individual readers were in their judgments of negative evaluative adjectives. The design precludes direct measurement since no subject saw the same adjective twice and each subject saw only three negated adjectives in any given type of context. We would like to measure individual consistency in a future experiment.

Turning to the adjectives, do all evaluative ones have the same likelihood of being interpreted implicatively? The same degree of susceptibility to the CONSONANCE/DISSONANCE effect? Although we have much less data for any one adjective than for them all considered together, the evaluative adjectives do not all appear to be the same.<sup>16</sup>

<sup>13</sup>It is hard to know which group a person who responded *Cannot decide* belongs to or, indeed, whether such people find the sentences ambiguous. The number of *Cannot decide* responses is consistently quite low across all conditions. Although the initial instructions included a case where *Cannot decide* was the only correct response, it is possible that some Turkers felt selecting *Cannot decide* responses too often would have negative consequences for payment. It might be better to phrase this option in positive terms, for example *The author could believe either A or B*.

<sup>14</sup>Responses to them were if anything marginally closer to their responses to dissonant sentences than to consonant ones.

<sup>15</sup>This page contains the blocks of actual test sentences in the file *factiveImplicativeAdjInputs.txt* and the distractors in *filler.txt* in the same directory.

<sup>16</sup>For each adjective separately, we have on the average 34 judgments,  $\geq 25$ ,  $\leq 45$ , in any one type of context.

Some adjectives, including *stupid*, *fortunate*, and *lucky*, receive a significant proportion of **I** readings in neutral contexts and show a strong CONSONANCE/DISSONANCE effect in the limited available evidence. **I** readings of these adjective are also frequently found in corpora. For *fortunate* the number of **I** interpretations in the NEUTRAL context was just over 56%, for *stupid* and *lucky* it was around 40% and the CONSONANCE/DISSONANCE effects were close to linear (adjusted  $R^2$  over 0.80) for all three. For *stupid*, moreover, we find over 25% of **I** interpretations in the DISSONANT context, further reinforcing the impression that it is regarded as implicative by a substantial number of English speakers.

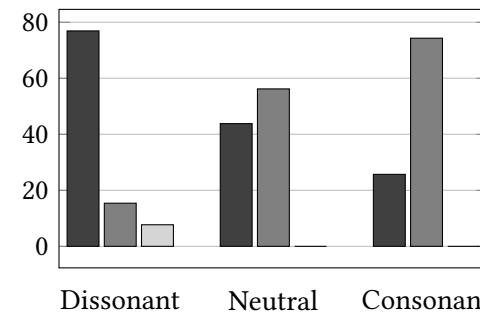
Figure 7 shows results for a representative adjective with a high percentage of **I** interpretations in neutral contexts. Such adjectives seem to be clear evidence for Hypothesis C. It is worth noting that the strength of the **I** interpretation may not always correlate with frequency of use on that meaning. Another adjective for which our results show a high percentage of **I** readings in the neutral case is *foolish*. Nevertheless, the ENTENTEN-2.0 corpus has few examples containing this adjective, and the examples on the WWW do not suggest a substantial proportion of **I** use.<sup>17</sup>

Some other adjectives show near linear CONSONANCE/DISSONANCE effects on the **I** reading but a considerably lower percentage of neutral **I** interpretations, e.g. *cruel*, *smart* and *polite* (20%), *evil* and *mean* (just above 10%). This suggests that having a normative **I** interpretation may not be the only cause of an adjective manifesting the CONSONANCE/DISSONANCE effect.

At the opposite end of the spectrum are adjectives like *arrogant*, *heroic*, *humble*, and *sensible*. For the first three, the pattern of responses is not inconsistent with Hypothesis A. There are relatively few **I** interpretations in both the DISSONANT and the NEUTRAL context and the number goes up only in the CONSONANT context; however, the **F** interpretations go down in the neutral case, where the **E** responses go up. Figure 8 shows the pattern of responses for a typical one these adjectives. The case of *sensible* is more difficult to understand, with nearly as many **I** inter-

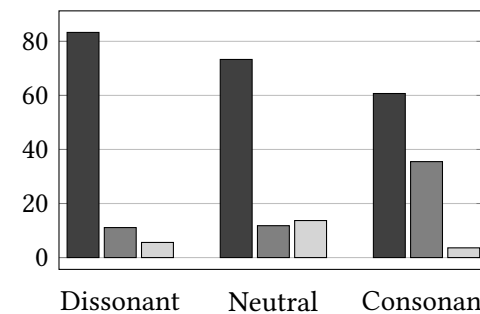
**Figure 7**

*NP was not fortunate to VP* (106 subjects)



**Figure 8**

*NP was not heroic to VP* (98 subjects)



<sup>17</sup>As to *brave*, results from the experiment are consistent with the hypothesis that it is implicative for a substantial minority: 28% of the neutral contexts get an **I** reading. However, we suspect our test sentences for this adjective were not well constructed as we also obtain 31% **I** responses in the DISSONANT context (and 33% in the CONSONANT context). The test sentences were:

- (12) a. Sally wasn't brave to flee the dragon. DISSONANT  
 b. Jane wasn't brave to mention the dragon. NEUTRAL  
 c. Tom wasn't brave to fight the dragon. CONSONANT

Perhaps all three contexts are too fantastic to be reliably classified along the CONSONANCE/DISSONANCE scale.

pretations in the *DISSONANT* context as the *NEUTRAL* and reasonably high percentages in both cases (21% vs. 22%). Use of these adjectives in the *NP was not Adj to VP* construction on the *WWW* is very limited, which does not help clarify the extent to which they can be used with the *I* interpretation.

It is premature to draw firm conclusions about differences between evaluative adjectives, given the limited data currently available. We would like to determine which of the trends just noted, if any, stand up in future experiments.

### 6.2 *CONSONANCE/DISSONANCE Context*

In the experiment described in section 4, the *CONSONANCE/DISSONANCE* context is always introduced in the *VP* of the target sentence. However, nothing about the effect requires this. One could set up a preceding context producing the same effect. As an example:

- (13) a. That outfit looks very unprofessional. Jane wasn't foolish to wear it to the interview.  
 b. That outfit looks very professional. Jane wasn't foolish to wear it to the interview.

We followed up the experiment already described with a smaller experiment that showed comparable results to the ones obtained when the context was in the *VP*. In fact, we conjecture that the context creating the *CONSONANCE/DISSONANCE* effect does not have to be verbal at all, which will complicate any attempt to predict the *I* or *F* readings automatically.

### 6.3 *Active versus Passive Language Use*

The judgments discussed so far are about how our subjects understood evaluative adjectives. As mentioned in section 3, there are differences between understanding and using a particular linguistic construct. Both the *WWW* and the *ENTEN-2.0* corpus provide evidence that some evaluative adjectives are sometimes used implicatively in the *NP was (not) Adj to VP* construction. (This evidence is clearest for *stupid*, *fortunate*, *lucky*, and *brave*.) We piloted an experimental approach to obtaining information about subjects' active language use in the follow-up experiment we ran with the *CONSONANCE/DISSONANCE* context provided by a preceding sentence. Fifty subjects who gave a stimulus an *F* or an *I* interpretation were then asked whether they themselves would use the target sentence to express the reading they had given to it.<sup>18</sup> Table 5 gives the results for this follow-up question regarding *F* and *I* interpretations in *Dissonant*, *Neutral*, and *Consonant VPs*.

**Table 5**

Positive responses to 'Would you say this yourself?'

Factive answers with dissonant examples	84%
Implicative answers with dissonant examples	79%
Factive answers with neutral examples	87%
Implicative answers with neutral examples	82%
Factive answers with consonant examples	83%
Implicative answers with consonant examples	79%

The percentage of Yes answers is consistently higher for the factive readings, but the dif-

<sup>18</sup>Subjects who responded *Either* were asked a different follow-up question.

ference (around 5%) is not overwhelming. So more than 18% out of the total 23% of speakers that we estimated earlier are implicative users in the neutral context responded that they themselves *would* use the negative sentence with the I meaning.<sup>19</sup> These pilot results suggest that a quite substantial minority of English speakers think upon reflection that the *NP was not Adj to VP* construction can properly be used with the implicative meaning. We want to follow up with a larger experiment using the technique that was successfully piloted for investigating subjects' active use of this construction. If the preliminary results hold up, this will show that a sizable population of English speakers has a norm allowing some evaluative adjectives to be used implicatively rather than factively.

Even now there is very strong evidence, we believe, that the evaluative adjectives classified in the linguistics literature as factive are not uniformly viewed this way by competent speakers of English. Some are both understood and actively used as genuine implicatives by some speakers, whereas other speakers view all evaluative adjectives as lexical factives. For all these adjectives there is, in any event, a CONSONANCE/DISSONANCE context effect.

#### 6.4 Possible Causes of the CONSONANCE/DISSONANCE Effect

As mentioned earlier, the CONSONANCE/DISSONANCE effect could result from either, or both, of two causes. (SEMANTIC) The context dependency might in some way and to some extent be built into the factive and implicative lexical meanings of evaluative adjectives themselves. (PRACTICAL) As a comprehension effect, CONSONANCE/DISSONANCE might in some measure result from communication pressures to treat other people's statements as saying something 'sensible'. It is beyond the scope of this paper to delve more deeply into the potential SEMANTIC cause. However, we do say more here about communication pressures on readers, both because they are undoubtedly at work in language comprehension and because they might be urged in defense of Hypothesis A—as providing a fully satisfactory explanation of how apparent type I uses of evaluative adjectives are successfully understood the way the producer intended them to be despite being contrary to what the sentences actually mean in English.

People do, after all, make mistakes in using language. A not uncommon one is to say the opposite of what one means to say. Successful communication often occurs despite these mistakes. Hearers and readers sometimes detect apparent incongruity between a sentence actually produced and what they would expect its producer to avow, in view of other available indicators. Interpreters then sometimes adjust their interpretation to be more in line with what they think the producer likely intended.<sup>20</sup> The factive reading of a negated evaluative adjective in a consonant context might be perceived as an incongruous statement; an interpreter could find the proposition that *NP VPing was not Adj* hard to reconcile with a predisposition toward assuming that *for NP to VP* would be *Adj*. A cooperative reader might accordingly resolve the apparent conflict by viewing the producer as having meant that *NP did not VP* and it was *NP not VPing* that was not *Adj*. Indeed, many members of English's determinedly factive majority of speakers profess that sentences like (5) and (8) are mistakes; the producer must have inadvertently omitted *enough* before the *Adj*. These interpreters clearly recognize the producer's intent to express the implicative reading; and they are so convinced that the sentence produced

<sup>19</sup>And possibly some of the more than 13% of speakers who gave the F reading but then said they WOULD NOT themselves use the negative sentence with this reading might also be implicative speakers.

<sup>20</sup>For steps toward such a theory see Gibson et al. (2013). The cases discussed there are all syntactic and of a very different nature than the one we are studying here.

should not be used this way that they ‘mentally revise’ it to another sentence whose meaning is close to what they think the producer must have meant.

This may be part of a full story about why implicative readings of negated evaluatives are more likely in consonant contexts than in neutral ones. However, it is by no means an adequate defense of Hypothesis A in relation to the data presented in this paper. For one thing, it applies to interpretation but not to production; yet in all contexts the majority of our subjects who interpreted sentences implicatively stated they would themselves use the sentences with that meaning. Secondly, it does not in fact explain how an interpreter perceives a producers’ intended meaning. If the writer made an error, why think it was, say, omitting *enough* rather than, for example, inadvertently inserting *not*? The latter revision leads to a positive factive interpretation that is compatible with consonance, but it does not yield an implicative interpretation of the given sentence! Thirdly, communicative pressures influencing the interpretation of language uses apply to all expressions, not just a select few; so any serious attempt to explain away as errors data supporting implicative uses of negated evaluative adjectives in consonant contexts must be consistent with how evaluatives are used in their full range of contexts. And dissonant affirmative sentences containing evaluative adjectives could appear just as incongruous as consonant negative ones: How can the proposition that *NP VPing* was *Adj* be reconciled with a predisposition to assume that *for NP to VP* would not be *Adj*? Yet one sees hardly any tendency for people to interpret dissonant affirmative evaluatives like *Audrey was smart to take the worst piece* (from Table 4) as meaning either what (14a) does or the factive reading of (14b).

- (14) a. Audrey was too smart to take the worst piece.  
b. Audrey was not smart to take the worst piece.

## 7 Presuppositions and Assertions of Factive and Implicative Evaluatives

As discussed in section 1, the traditional factive analysis of evaluative adjectives in the construction *NP was (not) Adj to VP*—the norm for speakers whose intuitions are represented by Table 1—is that both sentences presuppose *NP VPed*, and the affirmative one asserts *NP VPing* was *Adj*, while the negative one denies this. We propose, however, that it is better to analyze the proposition that, for example, (1) asserts and (2) denies as (15).

- (15) For the Raiders to draft Russell would have been stupid.

In general, we take an affirmative factive sentence of this form to assert that *for NP to VP* would have been *Adj*, and a negative sentence to assert the negation of this proposition. We think the major difference between a statement like (1) and one like (15) lies in what they presuppose, not what they assert. This is evident from the fact that the questions (16a) and (16b) request the same information, differing mainly in that asking the latter question presupposes that the Raiders drafted Russell while asking the former does not.

- (16) a. Would it have been stupid for the Raiders to draft Russell then?  
b. Was it stupid for the Raiders to draft Russell?

The propositions *NP VPed* and *for NP to VP* would have been *Adj* jointly imply that *NP VPing* was *Adj*. So this analysis explains why factive users of this construction feel that (3a) follows from (1), even though it is not what sentence (1) asserts. Similarly, the propositions *NP VPed* and *for NP to VP* would not have been *Adj* jointly imply that *NP VPing* was not *Adj*, explaining



why these language users feel that (3b) follows from (2) despite not being what (2) asserts. Thus we adopt this friendly amendment to the traditional factive analysis of the construction.

As for the implicative interpretation, we pointed out it presupposes a biconditional (6) according to the analysis of two-way implicatives in Karttunen (1971). This presupposition could equivalently be thought of as (17).

- (17) If NP were to have VPed, that would have been Adj; and if NP were not to have VPed, that would not have been Adj.

The affirmative sentence *NP was Adj to VP* asserts that what *NP* did with regard to *VPing* or *not VPing* was *Adj*. The affirmative sentence's implications shown in Table 2 follow from interaction between its presupposition and its assertion. The presupposition (6), or equivalently (17), plus the asserted proposition *what NP did re VPing was Adj* together imply *NP VPed* because they are not jointly consistent with *NP did not VP*. That consequence plus the asserted proposition jointly imply *NP VPing was Adj*. In a similar way the proposition *what NP did re VPing was not Adj* asserted by the negative sentence *NP was not Adj to VP* combines with the presupposition to yield the negative sentence's implications in Table 2.

Setting aside for now potential SEMANTIC variation of lexical meaning with context, the semantic contributions of factive and implicative evaluative adjectives in sentences of the form *NP was (not) Adj to VP* are as summarized in Table 6.

**Table 6**

NP was Adj to VP	FACTIVE	IMPLICATIVE
Presupposition	NP VPed	For NP to VP would be Adj & for NP not to VP would not be Adj
Assertion	For NP to VP would be Adj	What NP did about VPing was Adj
<hr/>		
NP was not Adj to VP		
Presupposition	NP VPed	For NP to VP would be Adj & for NP not to VP would not be Adj
Assertion	For NP to VP would not be Adj	What NP did about VPing was not Adj

## 8 Conclusion

In this paper we first showed that, contrary to what the, admittedly scant, linguistic literature leads us to expect, the *NP not be Adj to VP* construction with evaluative adjectives is not always interpreted as factive but can also have an implicative reading. We then isolated contextual factors that lead to a preference for the factive (**F**) or implicative (**I**) interpretation. We called these contexts **DISSONANT** and **CONSONANT**. In the consonant interpretation the speaker/writer seems to believe that *for NP to VP would be Adj* and that the readers too would be predisposed to this view. In a consonant context, a negative statement that *NP was not Adj to VP* pushes the hearers towards the **I** interpretation, that is, that the *NP* did not *VP*. In the **F** interpretation, there is a predisposition to assume or to grant that *for NP to VP would not be Adj*. A dissonant context favors the **F** interpretation. We conducted an experiment that showed that, indeed,

these contexts influence the interpretation of the evaluative *NP be ADJ to VP* construction. We also introduced test sentences where the *VP* refers to a situation that we did not consider to be either consonant or dissonant. The **I** interpretations that were given in that context argue for the view that all the **I** interpretations cannot be due to some accommodation to the context but that there are, in fact, speakers for whom the evaluative construction is a normative language use.

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