Complement coercion and aspectual adjectives in Canadian English*

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This paper presents an eye-tracking study of the Canadian English *be done NP* construction (e.g., *I'm done/finished my homework* to mean *I've finished my homework*). Results suggest a processing penalty for entity-denoting nouns like *the script* (compared to event description nouns like *the audition*) in this construction, which supports Fruehwald and Myler's (2015) proposal that these aspectual adjectives behave like aspectual verbs (*begin*, *finish*, etc.) in requiring complement coercion and type-shifting for entity-denoting nouns.

1   Introduction

The focus of this paper is complement coercion, such as in the sentence *the child began the book* (Briscoe, Copestake, & Boguraev, 1990; Jackendoff, 1997; Pustejovsky, 1991, 1995). According to the literature on coercion, aspectual verbs like *begin* select as their complement an event description like *to dance*, *dancing*, or *the dance*. However, *the book* denotes an entity; such a mismatch can be solved if the entity-denoting noun is coerced into an event description, which means that the entity-denoting noun is reinterpreted as an event involving that entity. In the case of *the child began the book*, *the book* is understood as *reading the book* (depending on the subject and context it can also be *writing the book*, etc.). Psychological verbs like *enjoy* and *prefer* have traditionally been grouped in with aspectual verbs like *begin* and *finish* as event-selecting verbs that require complement coercion for entity-denoting objects (although more recently Katsika, Braze, Deo, & Piñango, 2012, have presented evidence that psychological verbs do not fit into this category). The term *coercion* was introduced to linguistics by Moens and Steedman (1988), and it has also been used to describe the repairing of mass/count and aspectual mismatches.

Early studies of complement coercion using self-paced reading and eye-tracking techniques (McElree, Traxler, Pickering, & Seely, 2001; Pickering, McElree, & Traxler, 2005; Traxler, Pickering, & McElree, 2002) found that the combination of an event-selecting verb and an entity-denoting NP is slower or more difficult to process compared to other verb and object combinations that are not hypothesized to involve complement coercion. This processing effect has widely been taken as evidence that coercion involves *enriched composition*, meaning that it involves an extra-syntactic operation that interpolates new semantic material not present in the actual expression (Pickering et al., 2005; Piñango, Zurif, & Jackendoff, 1999; Pylkkänen & McElree, 2006). Pustejovsky (1991, 1995) calls this operation *type-shifting*, while Jackendoff (1997) simply describes it as a rule saying *interpret NP as an activity involving NP*. Under the (widespread) assumption that this type-shifting process is computationally costly, such an analysis can explain the processing effects of complement coercion.

Type-shifting is the most plausible explanation given the existing evidence, although other explanations for the processing effect of coercion have also been suggested. de Almeida and Dwivedi (2008) argue that complement coercion involves extra structure in the form of a silent VP between the coercion verb and

the noun, and that this (rather than an operation such as type-shifting) is the reason for the processing effect of coercion. However, Pylkkänen and McElree (2006) present evidence against coercion involving a silent VP, including an inability to adverbially modify the supposed silent VP. Another possible explanation is that the processing effect of coercion is a result of having to infer an event from an entity (e.g., to determine whether *began the book* refers to *reading*, *writing*, *colouring*, etc.). However, multiple studies find that varying the need to infer the event (Traxler, McElree, & Williams, 2005, by providing a context sentence, and Frisson & McElree, 2008, by choosing coercion sentences with more or fewer interpretations) does *not* affect the processing effect of coercion.

The linguistic phenomenon of interest in this paper is the *be done NP* construction seen in (1) and (2), which is found in Canadian English and in a few varieties of American English, specifically in Philadelphia and Vermont (Fruehwald & Myler, 2015; Yerastov, 2008, 2012).

(1) I'm finished my homework.

(2) I'm done my homework.

The meaning is equivalent to the aspectual verb *finish* in the perfect, as in (3). The meaning of this construction has overlap with the dialect-neutral prepositional *be done with NP* construction in (4) and (5), but they are not the same. *Be done NP* requires that the object be completely finished while *be done with NP* also allows cases where the subject has lost interest (if someone completes half of their homework and moves to another task, they are *done with their homework* but not *done their homework*).

(3) I've finished my homework.

(4) I'm finished with my homework. (*be done with NP*)

(5) I'm done with my homework. (*be done with NP*)

The difference in interpretation between *be done NP* and *be done with NP* is evidence that *be done NP* should not be analysed as involving a silent preposition equivalent to *with*. Yerastov (2008, 2012) argues that *be done NP* is best analyzed as the perfect but with a non-standard auxiliary (*be* instead of *have*), based in part on parallels with the *be*-perfect in Scottish English. However, Fruehwald and Myler (2015) argue against the *be*-perfect analysis for this Canadian English construction for a variety of reasons. Notably, *all* is compatible with *be done NP* (6) and with adjectives (7) but not perfect participles (8).

(6) I'm all done my homework.

(7) I'm all ready for school.

(8) *I've all done my homework.

Instead, Fruehwald and Myler propose that *be done NP* involves an adjective that directly takes as its complement an NP (without a silent intervening PP or VP). This is not common in English but is also not unprecedented (as in *be worth NP*). Because *done* and *finished* are adjectival versions of aspectual verbs, they argue that these aspectual adjectives semantically select for an event description and require complement coercion and type-shifting for interpretation of entity-denoting nouns. This hypothesis should be testable with reading measures. Do we find longer reading times for entity-denoting nouns than for event description nouns in this construction, as is found for aspectual verbs?

The present study is an eye-tracking experiment comparing entity-denoting nouns and event description nouns in two constructions: the Canadian English *be done NP* and the dialect-neutral *be done with NP*. Results suggest longer reading times for entity-denoting nouns than for event description nouns in the *be done NP* construction (but not the *be done with NP* construction). This supports Fruehwald and Myler's hypothesis that the aspectual adjectives in this Canadian English construction behave similarly to aspectual

verbs in requiring complement coercion and type-shifting for entity-denoting nouns.

2   Canadian English *be done NP* experiment

This experiment tests whether there is a penalty for entity nouns compared to event nouns in the Canadian English *be done NP* construction and in the dialect-neutral *be done with NP* construction.

2.1   Method

2.1.1 Participants

Thirty-six native speakers of (primarily Southern Ontario) Canadian English (mean age = 25, sd = 11) took part in this experiment at the University of Toronto. An additional 28 participants took part but were excluded from analysis: five due to excessive blinks or track loss, 21 for not being native speakers of Canadian English, and two for indicating that the *be done NP* construction did not sound natural or acceptable to them. Participants were compensated with $10 or course credit. They provided written informed consent prior to partaking in the experiment.

2.1.2 Items

The stimuli for this experiment contrasted event description nouns (like *the audition* and *the interview*) with entity-denoting nouns (like *the script* and *the resume*) in the Canadian English *be done NP* construction and in the dialect-neutral *be done with NP* construction. Crossing these two factors resulted in four conditions, as seen below.

(9)   After the girl was finished *the fight* against the playground bully, she went for a walk. (*be done NP* + event object)

(10)   After the girl was finished *the comic* about flying superheroes, she went for a walk. (*be done NP* + entity object)

(11)   After the girl was finished with *the fight* against the playground bully, she went for a walk. (*be done with NP* + event object)

(12)   After the girl was finished with *the comic* about flying superheroes, she went for a walk. (*be done with NP* + entity object)

In total there were 32 such quadruplets. They all followed a similar structure of a preposed subordinate clause (which included the construction of interest) and a shorter main clause. However, there were also differences between the quadruplets: half had a singular subject and half a plural subject, half had the adjective *done* and half had the adjective *finished*, and they also varied regarding their conjunction and temporal reference (past with *after*, present with *because*, and future with *when*). Participants only saw one sentence from each quadruplet, which means that they saw either an event description object or an entity-denoting object. The object that they did not see could be reused and shown to them in a later quadruplet, and so in the 32 quadruplets there were a total of 16 event description nouns and 16 entity-denoting nouns (rather than 32 of each). The nouns are provided below.

(13)   Entities: comic, resume, prescription, script, report, autobiography, article, album, juice, coffee, hamburger, message, letters, essay, champagne, software

(14)   Events: fight, interview, presentation, audition, lecture, speech, conversation, concert, party, celebration, visit, gala, battle, competition, game, discussion

The mean length of the event nouns (7.625 characters) and entity nouns (7.25 characters) did not differ significantly, according to an independent t-test ($t_{29.293}$ = 0.40018, p = 0.69). In addition, the (log-transformed) frequencies of the event nouns and entity nouns did not differ significantly in the usenet-based Hyperspace Analogue to Language (HAL) corpus (event: 9.69, entity: 9.47, $t_{28.157}$ = -0.39698, p = 0.69) or in the movie subtitle-based SUBTLEX corpus (event: 3.15, entity: 2.92, $t_{29.982}$ = 1.1263, p = 0.27), both of which were accessed through the English Lexicon Project (Balota et al., 2007). Reading times would not be expected to vary between the two groups of nouns as a result of their length or frequency.

2.1.3 Procedure

Participants were seated in a height-adjustable chair wearing the EyeLink II head-mounted video-based eye-tracker (which had a sampling frequency of 250 Hz). The text was displayed on a computer screen in black 25 pt Times New Roman font on a white background. They were instructed to read each sentence at a normal reading pace, well enough to understand the sentence and answer comprehension questions (which followed every trial). Comprehension questions were asked about different parts of the sentence (the subject, the object, or the event in the second clause). For example, the comprehension question after *When the musician is finished the concert at the new venue, he will take some time off* was *What will the musician do?*. The eye-tracker was calibrated using a series of three fixed targets across the display at the beginning of the experiment, and recalibration was performed later on when judged necessary by the experimenter.

Each trial began with a fixation target on the screen in the position that would be taken by the first letter of the sentence. Participants were instructed to fix their gaze on this target, at which point the experimenter started the trial and made the sentence appear on the screen, all on one line. After reading silently, participants pressed the trigger at the back of a game controller to bring up the comprehension question, which they answered with the triggers as well. Feedback was not provided. After selecting their response, participants were immediately brought back to the screen with the fixation target, and the next trial started once they fixated on that target. Viewing was binocular, but only the left eye was recorded. All participants performed very well on the comprehension questions.

Participants encountered the stimuli in a random order, mixed in with stimuli from three other eye-tracking experiments that they were simultaneously participating in. The present experiment comprised 32 of the 120 total sentences that each participant saw. Each participant was assigned to one of four lists, which affected which of the four sentences in each stimulus quadruplet they saw. The entire session took approximately 30 minutes.

2.2 Results

Each sentence was divided into six regions, as in Table 1. Region 3 was the object, and thus the critical region.

Table 1: Sentence regions for experiment 1.

R1	R2	R3	R4	R5	R6
After the girl	was finished (with)	the fight	against	the playground bully,	she went for a walk.

Five reading measures are reported here for the critical region (R3): first-pass time (a.k.a gaze duration), first-pass regression ratio, go-past time (a.k.a. regression path duration), second-pass time, and total time. First-pass time is the time from first entering the region before moving on or looking back; first-pass regression ratio is the likelihood of reading a region for the first time and then re-reading an earlier region; go-past time is the time from first entering a region until moving on to a later region (including time spent

re-reading an earlier region); second-pass time is the time from entering the region for a second time before moving on or looking back; and total time is all of the time spent in the area regardless of when it happened. The reading measures selected were those used in previous eye-tracking studies of coercion (Pickering et al., 2005; Traxler et al., 2005, 2002).

Manual cleanup of the data was performed to remove trials with blinks or track loss on the critical region (or one saccade away from it) on first-pass reading and trials where the fixations indicate that the participant did not read the whole sentence (for example, they only fixated at the beginning of the sentence and then pressed the trigger to move on, possibly accidentally). Comprehension questions were used to encourage participants to read the simuli carefully, but incorrect comprehension questions were not used to exclude trials (on multiple occasions, participants remarked to the experimenter that they pressed the wrong button, suggesting that they were paying attention). In total, 11.2% of the trials were deleted. The five reading measures for R3 are shown below, separated by construction for better visibility. Keep in mind when looking at the results that a longer reading time (or more regressions) for entities compared to events is the finding that suggests coercion effects.

Table 2: Scores for critical region (R3) for be done NP

Object	First-Pass Time	First-Pass Reg.	Go-Past Time	Second-Pass Time	Total Time
Entity	381 ms	27.4%	545 ms	319 ms	650 ms
Event	359 ms	25.4%	480 ms	263 ms	586 ms

Table 3: Scores for critical region (R3) for be done with NP

Object	First-Pass Time	First-Pass Reg.	Go-Past Time	Second-Pass Time	Total Time
Entity	330 ms	17.8%	395 ms	270 ms	494 ms
Event	324 ms	20.5%	411 ms	288 ms	518 ms

R (R Core Team, 2016) and *lmerTest* (Kuznetsova, Brockhoff, & Christensen, 2016) were used to perform a linear mixed effects analysis of the relationship between each of these five reading measures, the noun type, and the construction. Fixed effects were noun type (event or entity) and construction (*be done NP* or *be done with NP*). As random effects, all five analyses had random intercepts for subjects and items. Three analyses (for first-pass time, go-past time, and total time) also had by-subject and by-item random slopes for noun type and construction. For first-pass regressions and second-pass time, a model with these random slopes failed to converge and so the results from a model with a simpler random effects structure that has only random intercepts will be presented. The analyses for each of the five reading measures are presented below. They include the fixed effects of noun type (entity or event noun), construction (*be done NP* or *be done with NP*), and interaction between noun type and construction.

2.2.1 First-pass time

Table 4: First-pass time, critical region (R3)

Fixed Effects	Estimate	Std. Error	df	t-value	Pr(>|t|)	Sig
(Intercept)	348.753	14.500	37.300	24.052	< 2e-16	***
Noun Type	8.624	6.750	32.500	1.277	0.21048	
Construction	20.639	6.298	85.300	3.277	0.00152	**
Noun:Construction	3.937	5.711	518.600	0.689	0.49085	

First-pass time is the time from first entering the region before moving on or looking back. The mixed-effects analysis found a significant effect of construction, but no effect of noun type, and no interaction between construction and noun type.

2.2.2 First-pass regressions

Table 5: First-pass regressions, critical region (R3)

Fixed Effects	Estimate	Std. Error	z-value	Pr(>|z|)	Sig
(Intercept)	-1.32892	0.13291	-9.999	< 2e-16	***
Noun Type	-0.02617	0.09071	-0.289	0.77295	
Construction	0.21294	0.08048	2.646	0.00815	**
Noun:Construction	0.08035	0.08035	1.000	0.31731	

First-pass regression ratio is the likelihood of reading a region for the first time and then re-reading an earlier region. The analysis found a significant effect of construction, but no effect of noun type, and no interaction between construction and noun type.

2.2.3 Go-past time

Table 6: Go-past time, critical region (R3)

Fixed Effects	Estimate	Std. Error	df	t-value	Pr(>|t|)	Sig
(Intercept)	455.685	22.940	42.550	19.864	< 2e-16	***
Noun Type	12.664	12.184	28.720	1.039	0.3073	
Construction	51.839	10.568	46.690	4.905	1.17e-05	***
Noun:Construction	20.477	9.357	54.880	2.188	0.0329	*

Go-past time is the time from first entering a region until moving on to a later region (including time spent re-reading an earlier region). The analysis found a significant effect of construction, no effect of noun type, and an interaction between construction and noun type. This interaction is important. Post-hoc analyses using paired t-tests found that entity nouns were read significantly longer than event nouns in the *be done NP* construction (by subjects: t_{35} = -2.2396, p = 0.03157; by items: t_{15} = -2.3541, p = 0.03262) but that there was no difference between noun types in the *be done with NP* construction (by subjects: t_{35} = 0.77491, p =

0.4436; by items: $t_{15} = 0.73509$, p = 0.4736).

2.2.4 Second-pass time

Table 7: Second-pass time, critical region (R3)

Fixed Effects	Estimate	Std. Error	df	t-value	Pr(>|t|)	Sig
(Intercept)	283.948	7.562	30.500	37.551	< 2e-16	***
Noun Type	9.351	6.887	445.600	1.358	0.17522	
Construction	6.542	6.885	444.300	0.950	0.34251	
Noun:Construction	18.421	6.877	438.300	2.679	0.00767	**

Second-pass time is the time from entering the region for a second time before moving on or looking back. The analysis found no effect of construction or noun type, but there was an interaction between construction and noun type. According to post-hoc analyses using paired t-tests, entity nouns had a significantly longer second-pass time than event nouns in the *be done with NP* construction (by items: $t_{15} = -2.2282$, p = 0.04159) but there was no difference between noun types in the *be done with NP* construction (by items: $t_{15} = 0.78446$, p = 0.445).[1]

2.2.5 Total time

Table 8: Total time, critical region (R3)

Fixed Effects	Estimate	Std. Error	df	t-value	Pr(>|t|)	Sig
(Intercept)	560.332	32.021	46.810	17.499	< 2e-16	***
Noun Type	9.757	17.865	29.770	0.546	0.589	
Construction	52.935	11.270	89.510	4.697	9.48e-06	***
Noun:Construction	19.872	10.909	117.300	1.822	0.071	.

Total time is all of the time spent in the area regardless of when it happened. The analysis found a significant effect of construction, no effect of noun type, and a marginal interaction between construction and noun type. A visual inspection of the data finds the longest total time for entities in the *be done NP* construction.

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[1]Not all trials had a second-pass time. By-subjects analysis was not possible due to missing data, and so only by-items analysis is presented.

2.2.6 Summary

The following table shows a summary of the significant results on each measure.

Table 9: Summary of results (significance codes: 0 *** 0.001 ** 0.01 * 0.05 mar 0.1 n/s 1)

Effect	First-Pass Time	First-Pass Reg.	Go-Past Time	Second-Pass Time	Total Time
Noun Type	n/s	n/s	n/s	n/s	n/s
Construction	**	**	***	n/s	***
Noun:Construction	n/s	n/s	*	**	mar

2.3   Discussion

In none of the five measures was noun type significant, which rules out an overall coercion effect (a penalty for entity nouns compared to event nouns) that applies to both constructions. In four of the five measures (second-pass time was the exception), there was a significant effect of construction, as a result of the objects in *be done NP* having longer reading times (and more regressions) than objects in *be done with NP*. The reason for this is not evident; there is no clear precedent in the previous literature that would suggest this, as there has been (to my knowledge) no processing study of the *be done NP* construction. It is possible that *be done NP* is a less common construction.

The most important result is the interaction. In two of the five measures (go-past time and second-pass time) there was a significant interaction between noun type and construction, and in one other measure (total time) the interaction was marginal. The meaning and implication of this interaction will be discussed below, but first it is important to mention that failure to find this result on every measure is not unexpected. Go-past time is based on first-pass time and first-pass regressions, so smaller (non-significant) trends in those measures can compound into a larger effect that is visible (and statistically significant) in go-past time. The measures where a significant or marginal interaction was found (go-past time, second-pass time, and total time) in this experiment line up with the reading measures where a significant or marginal coercion effect was found in Traxler et al. (2002), the original study establishing coercion effects in eye-tracking.

As for the meaning of this interaction, post-hoc t-tests showed that the interaction was a result of entity-denoting nouns having longer go-past time and second-pass time in the *be done NP* construction but there being no difference between noun types in the *be done with NP* construction. The penalty for entity-denoting nouns found in *be done NP* on these measures is consistent with the processing effects of coercion, and so this result supports Fruehwald and Myler's (2015) proposal that the adjectives in this construction select for an event description and require complement coercion for interpretation of an entity-denoting noun (in a similar manner to *finish* and other aspectual verbs).

The lack of difference between the noun types in the *be done NP* construction could indicate that the addition of the preposition eliminates the selectional requirement for an event description, and thus the need for type-shifting when encountering an entity-denoting noun. Alternatively, the preposition could somehow anticipate the upcoming type-shifting operation and attenuate the cost. This would be similar to the finding of Frazier and Frisson (2005) that processing effects of mass $\rightarrow$ count coercion (like in *yesterday, I bought imported beers at the counter of the local supermarket*) were attenuated when a numeral was provided before the object to make the reader anticipate a count interpretation (*yesterday, I bought three imported beers at the counter of the local supermarket*).

3 Conclusion

Previous literature has shown that entity-denoting objects have a processing cost when following event-selecting verbs (like *begin the book*). This cost has been associated with the need to coerce and reinterpret *the book* as an event in that context (*begin [the book]* → *begin [reading the book]*). Results from an eye-tracking study presented here found that entity-denoting objects also have a processing cost in the Canadian English *be done NP* construction (*I'm done the book*), suggesting that these aspectual adjectives behave similarly to aspectual verbs in selecting for event descriptions and requiring coercion for interpretation of entity-denoting nouns, as was argued by Fruehwald and Myler (2015).

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