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HOW COMPLEX ARE DEVERBAL NOUNS? ARGUMENT AND EVENT STRUCTURE IN SYNTHETIC *-ING* COMPOUNDS IN ENGLISH¹

In the morphosyntactic literature, there exist two approaches to the problem of argument structure in English nominal synthetic compounds such as *furniture moving* or *dog training*. According to Borer (2012), such synthetic compounds belong to the class of referential nominals and thus lack argument structure. On the other hand, Alexiadou (2017) maintains that the external argument is present in the structure of synthetic compounds due to their ability to co-occur with *by*-phrases. In this paper, we present an extensive set of corpus data to show that synthetic *-ing* compounds do project the external argument, which is evidenced by their ability to license not only *by*-phrases but also agent-oriented adjectives and instrumental phrases. Importantly, the corpus data indicates that certain synthetic *-ing* compounds display the capacity to occur in aspectual contexts; nominal compounds fall in two classes in that regard.

Keywords: *noun, synthetic compound, argument structure, Distributed Morphology*

1. Introduction

The syntax of synthetic compounds is of inherent interest to language researchers. Synthetic compounding in English has been extensively studied in the morphosyntactic literature by Di Sciullo (1992), Ackema and Neeleman (2004), Harley (2009), Borer (2012, 2013) and Alexiadou (2017), among others. The majority of accounts of synthetic compounds revolve around the question of whether and to what extent they are structurally complex. This paper aims to

¹ This research was funded by grant 2018/29/N/HS2/01377 from National Science Centre, Poland.

further contribute to the study of argument structure in synthetic compounds. More specifically, the objective of this research is to establish whether compounds expressing episodic events (e.g. *ship sinking*, *book burning*, *missile launching*) differ in terms of the capacity to license argument and event structure from compounds which express habitual events such as *decision making*, *gift giving*, *risk taking*.

The analysis will be performed within the current Distributed Morphology (DM) framework, originally proposed by Halle and Marantz (1993), which assumes that syntax functions as a single generative engine responsible for the creation of both sentences and words (hence there is no separate morphological component). DM posits further that all linguistic derivation has its beginnings in the lexical projection known as the root (Marantz 1997, Arad 2003). Complex words are constructed by combining roots with functional heads (Alexiadou 2001, Embick 2003, Alexiadou et al. 2015). In this paper, we will follow the assumption first proposed in Kratzer (1996) that the external argument is introduced by the VoiceP projection; we will also follow Alexiadou and Schäfer (2011) in that internal arguments are projected by the vP head.

The paper is organized as follows: in section 2 we will introduce the division into episodic and habitual compounds and outline the most important differences between them. Section 3 will be dedicated to the discussion of the two leading approaches to the ability of nominal *-ing* compounds to license argument structure, namely that of Borer (2012) and Di Sciullo (1992). In section 4 we will examine the external syntax of synthetic *-ing* compounds in order to test whether the current approaches to the question of argument and event structure in deverbal nominals can be adopted to our analysis of synthetic *-ing* compounding. Finally, our findings will be summarized in Section 5.

The majority of linguistic examples quoted in the paper have been extracted from the Corpus of Contemporary American English; all the non-corpus examples have been verified as being produced by native speakers.

2. Two types of nominal *-ing* compounds in English

Nominal *-ing* compounds in English come in two types depending on the temporal characteristics of the event denoted by the base verb. Compounds such as *poetry reading*, *book burning*, *record breaking* or *furniture moving* are often used to refer to single events whereas compounds such as *decision making*, *rule breaking* or *risk taking* can only express events which happen periodically.²

² Throughout this paper, we will refer to compounds of the *poetry reading* and *risk taking* types as episodic and habitual *-ing* compounds, respectively.

There exist two essential differences between the two categories of compounds. Firstly, only episodic compounds can undergo pluralization, as shown in (1) below:

- (1)
- a. Veterans of the Great War wrote of **prisoner killings** in letters home and openly discussed the subject with friends (...).
 - b. This, together with several recent **record breakings**, has prompted scientists to argue that there should be a relation between the two observable records.
 - c. Most **employee sackings** require a written warning to terminate a working relationship.
 - d. Presidents' Day is a kind of pseudo-holiday – a day without ceremonies, without special church services, without candle lightings or **gift-givings** or weird traditional foods, without even much reason for contemplation.
 - e. Many disciplines have increasingly offered evidence that moral emotions influence moral **decision making**/***decision makings**.
 - f. The same assumption can be seen in those psychological approaches that are concerned with personality and moral development in relation to **rule breaking**/***rule breakings**.
 - g. The Greek bailout drama reduced investors' appetite for **risk taking**/***risk takings**.
 - h. The tax administration even held a contest in which children wrote poems lauding the benefits of **tax paying**/***tax payings**.

Furthermore, episodic compounds can be preceded by both definite and indefinite articles, the latter being ruled out with habitual compounds:³

- (2)
- a. Tens of thousands of religious articles and every extant Mayan holy manuscript that the priests, led by Bishop Diego de Landa, could find in the territory fed the flames in **a book burning** (...).
 - b. The happiness of making and sharing a poem were on display at **a poetry reading** we attended, as were the hardships in these lives.
 - c. You could then impart this information into your particle system and have a very realistic simulation of **a rocket launching**.
 - d. This experience of prasāda in turn tends to prompt **a gift-giving**, which often leads to a miraculous display of some sort.

³ Notably, every episodic *-ing* compound can also be interpreted habitually:

- (i) a. Adding rhythm instruments, especially to poetry reading, emphasizes the uses of rhythm in language.
- b. Book burning wasn't invented in the twentieth century.

- e. *a decision making
- f. *a rule-breaking
- g. *a risk taking
- h. *a tax paying

In the subsequent sections, we will argue that episodic and habitual compounds are identical as regards the ability to co-occur with modifiers pointing to the presence of the external argument; however, they differ with respect to the capacity to license modifiers which are of aspectual nature.

3. Synthetic compounds and argument structure – what we know

3.1. Grimshaw's (1990) and Borer's (2012) classification of nominals

As maintained by Grimshaw (1990), nominalizations come in three classes labelled result nominals (e.g. *exam*), simple event nominals (e.g. *trip*) and complex event nominals which include nominalizations derived from verbs by the suffixes *-ing*, *-ation*, *-ment*, *-al*, etc. According to her, only nominals belonging to the last group exhibit typical eventive characteristics such as the ability to license arguments as well as agent-oriented and aspectual modifiers. Also, result and simple event nominals are possible with both definite and indefinite articles whereas complex event nominals always require the definite article. This distinction is illustrated by the examples below (Alexiadou 2017: 56):

- (3) a. the frequent examination of the cat by the doctor
b. the destruction of the city in 3 hours
- (4) a. the frequent exams/frequent trips
b. the trip lasted one hour
c. the exam/*the trip was on the table
d. *the exam by Bill/*the trip by Mary

The features of Grimshaw's three types of nominals, as summarized by Alexiadou (2017: 56), are listed below:

(5) result nominals	simple event nominals	complex event nominals
no event reading	event reading	event reading
no internal argument	no internal argument	internal argument
no agent modifiers	no agent modifiers	agent modifiers

no <i>by</i> phrases	no <i>by</i> phrases	<i>by</i> phrases
no aspectual modifiers	no aspectual modifiers	aspectual modifiers
<i>frequent</i> + plural N	<i>frequent</i> + plural N	<i>frequent</i> + singular N
no article restrictions	no article restrictions	only definite articles

Grimshaw claims that the only common feature of simple and complex event nominals is event semantics. Our analysis of synthetic *-ing* compounds will differ from Grimshaw's account in that, as we will argue, nominal *-ing* compounds denoting simple events license argument structure.

In a similar fashion, Borer proposes to divide nominals into argument supporting (AS) and referential (R) nominals (Borer 2012: 105):

(6)	R-nominals	AS-nominals
	no role assignment; no obligatory complements	role assignment; obligatory arguments
	event reading not necessary	event reading necessary
	no agent-oriented modifiers	agent-oriented modifiers
	subjects are possessives	subjects are arguments
	<i>by</i> -phrases are non-arguments	<i>by</i> -phrases are arguments
	no implicit argument control	implicit argument control
	no aspectual modifiers	aspectual modifiers

Borer's R-nominals and AS-nominals correspond to Grimshaw's result and complex event nominals, respectively (Borer groups simple event nominals under the R-nominals category). Crucially, both Grimshaw and Borer agree that R-nominals do not license *by*-phrases and other agent-oriented modifiers, regardless of whether they express an event or not.

3.2. Two approaches to argument structure in synthetic *-ing* compounds

In the literature, there are two approaches to the question of whether nominal *-ing* compounds can host argument structure. Borer (2012) maintains that synthetic compounds are different from complex event nominals in that the former cannot occur with agent-oriented and event modifiers, unlike the latter. This contrast, as posited by Borer, is shown in (7) (Borer 2012: 112):

- (7) a. The breaking of the door by Mary in two minutes in order to retrieve her locked-up dog.
 b. The stabbing of the emperor by Brutus for ten minutes in order to kill him.
 c. (I watched) the door breaking (*by Mary) (*in two minutes) (*in order to retrieve her locked-up dog).

- d. (I read about) the emperor stabbing (*by Brutus) (*for ten minutes) (*in order to kill him).

Additionally, Borer reports that synthetic *-ing* compounds are similar to result nominals in that they are licit with the complement *this kind of*, which is a feature of result nominals but not AS-nominals. (Borer 2012: 113):

- (8) this kind of spouse terrorizing/dog grooming/child parenting/neighbourhood bullying/tomato growing/fast acting/door breaking/compound dissolving/door breaking/emperor stabbing

Borer notes also that synthetic *-ing* compounds may behave very much like simple event nominals in that they often refer to a single event, which is also a point made by Alexiadou (2017: 59), who illustrates this with the following examples:

- (9) a. The exam lasted 5 hours.
 b. The window breaking/furniture moving started at 8am, took place in my back yard, and didn't stop until I intervened.
 c. The book burning lasted 3 hours.

Borer's assumption is that because synthetic *-ing* compounds behave much like result or simple event nominals, they must be structurally non-eventive. As noted by Newmeyer (2009), a number of zero-derived nominals license argument structure (*The frequent release of the prisoners by the governor; The frequent use of sharp tools by underage children*). The Corpus data supports the prediction that underived nominals with an eventive reading are commonly found with agent-denoting *by*-phrases:⁴

- (10) a. The program includes weekly **classes by Austin tech professionals** ranging from financial models to legal issues to marketing strategies.
 b. Walmart charged into the grocery market about two decades ago, realizing that frequent **trips by grocery shoppers** could help improve traffic.
 c. The judge ordered him to undergo a series of physical and psychological **exams by** three doctors (...).
 d. Whilst news of Hostess' impending closing of its doors has set a mad **dash by** consumers to hurry up and stock up on Twinkies before they are forever gone the unimaginable has happened.

⁴ Underived event nominals can also be accompanied by causative *from*-phrases (*frequent headaches from stress*) and *of*-phrases which introduce the theme of the verb (*the gradual decline of morale*).

- e. Other highlights involve circular **parades by the horses** to the sound of bells, along with a few equestrian and acrobatic turns.
- f. The father of a so-called Dreamer, whose **arrest by immigration officials** sparked fears of an immigration roundup and drew a national outcry, has been charged with entering the country illegally in U.S. District Court in Seattle.

Simple event nominals can also co-occur with agent-oriented modifiers such as *deliberate* and *careful*:

- (11) a. There are odd occasions when there is an inadequate supply of meat in the camp, and the hunters will make a **deliberate trip** out in search of game.
- b. I bent my knees and picked up the skulls with my right, straightened, and began the **careful walk** up to the boathouse.

In our view, the above data is an indication that event-expressing nominals are at least able to project the external argument. Therefore, forms referred to by Grimshaw as “simple event nominals” are syntactically closer to her complex event nominals, or Borer’s AS-nominals. In section 4 we will argue that deverbal episodic compounds confirm the hypothesis that argument structure is licensed in nominals expressing single events.

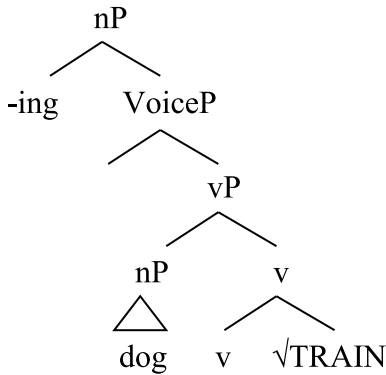
A different approach to synthetic *-ing* compounding is put forward in Di Sciullo (1992), according to whom nominal *-ing* compounds exhibit features typical of complex event nominals. They occur only with the definite determiner, are impossible as plurals and cannot appear in the predicative position. They are also shown to license *by*-phrases as well as agent-oriented and aspectual adjectives. These facts are shown below (Di Sciullo 1992: 75).⁵

- (12) a. The/*a/*one/*that taxi driving John did was exhausting.
- b. *The taxi drivings John did were fun.
- c. *That is a taxi-driving.
- d. Taxi driving by John can be dangerous.
- e. John’s deliberate taxi driving did not please Harry.
- f. Harry cannot stand his frequent taxi driving.

Drawing on the data in (12), Alexiadou (2017) argues that the structure of nominal *-ing* compounds contains the verbal projections vP and VoiceP. (12) presents the syntactic representation of *dog training* (Alexiadou 2017: 65).

⁵ Alexiadou (2017) reports that *by*-phrases appear to be impossible with deverbal compounds if the compound is preceded by the definite article.

(13) dog training



The above structure is headed by nP which produces a nominal construction. Below the nP head is the VoiceP projection, the presence of which is justified by the ability of *dog training* to license *by*-phrases. Importantly, Alexiadou's representation does not include the AspP head due to the impossibility of nominal *-ing* compounds to co-occur with aspectual modifiers (**dog-training in two minutes*, **frequent dog training*). In what follows, we shall verify the validity of the claims made so far against an extensive body of corpus data.

4. Argument and event structure in synthetic *-ing* compounds

4.1. Agent-oriented modifiers

The corpus data seem to confirm the hypothesis that *by*-phrases are licit with nominal *-ing* compounds. This is true for both habitual (13a-f) and simple event compounds (14a-f):

- (14) a. (...) it is important to take a look at strategic **decision making by management teams**.
 b. Regarding the enhancement of small groups, greater clarity by aligning learning outcomes with assigned tasks as well as requiring **note taking by every student** (...).
 c. **Gift-giving by companies** and **gift-taking by doctors** are widespread.
 d. President Clinton's election-inspired proposals to curb **tobacco smoking by teenagers** will help reduce the most preventable cause of ill health in America.

- e. Clinicians will recognize that some students, especially those with pragmatic language disorders or ASD, may be viewed as chronic “tattlers” in that they repeatedly inform teachers and school staff of **rule breaking bypeers**.
 - f. Kramer’s caution in this regard is warranted, and this article likewise presumes that **prisoner killing by British troops** was an exception rather than the rule.
- (15) a. (...) I attended a **poetry reading by Richard Fein**, an American poet who came to Yiddish as an adult (...).
- b. The **book burnings by the Spanish conquistadores** were so thorough that it has taken scholars scores of years of painstaking reconstruction to piece together some understanding of what the Native American intellect had actually produced in these calendars.
 - c. A series of panels and talks was included with **the film showings by the organizers** of the Edinburgh Film Festival in 1979.
 - d. A number of factors conspired to thwart the authentication of **ship sinkings by submarine skippers**.
 - e. The fifth problem is in the necessity to transfer the dialogue between Russia and America on (...) elaborating a common system for early warning on **missile launching by third parties** (...).
 - f. (...) insecure ownership rights over trees or forests granted to rural households have led to massive **forest clearings by the contracting farmers**.

The capacity of synthetic *-ing* compounds to license agent-oriented adjectives and instrumental phrases is also borne out by the corpus data:

- (16) a. Of particular importance is the fact that physical education assessment requires **rational decision making** in terms of what and how to assess within a particular unit of study.
- b. Critical reading helps students practise analytical thinking, and **skilful note taking** from readings can facilitate writing and referencing.
 - c. With the loon’s life cycle, it may take many years of **careful data collecting** to understand the effect on those loons which migrate to the Gulf.
 - d. The increasing demand for product quality brings in its train a requirement for component reliability, and that implies **meticulous component testing** also.
 - e. These written and formally accepted norms also can serve as a basis for **deliberate rule-breaking**.

- f. On the one hand, and to prevent **unintentional tax evasion**, citizens need to be educated and informed about what the current tax system requires of them.
- (17) a. Several months ago, Mr. Bush's top aides said they were prepared to offer Mr. Putin several incentives to abandon the ABM treaty and cooperate on a missile shield meant to repel such things as terrorist attacks, blackmail threats by rogue states, and **accidental missile launchings**.
- b. And he said as far as he's concerned **intentional church burnings** definitely are our business, so if anybody tries to get in our way over there.

Synthetic *-ing* compounds are found to accept instrumental *with* phrases, which further points to the presence of the external argument:

- (18) a. Wind **tunnel testing with scale models** provided perspectives on different improvements to reduce drag.
- b. The typical immigrant child may be able to assist in construction building, furniture building, **grass cutting with a cutlass** (...).

Grimshaw's three-way division of nominals appears to be insufficient for our analysis of nominal *-ing* compounds. It transpires from the corpus data that compounds referring to 'simple' events such as *poetry reading*, do not correspond to Grimshaw's simple event nominals due to the fact that they license argument structure modifiers. Both episodic and habitual compounds display numerous characteristics which indicate the licensing of argument structure.

4.2. How eventive are synthetic *-ing* compounds?

Despite the inability of synthetic *-ing* compounds to license frame adverbials such as *in 3 minutes*, they are found in unambiguously eventive environments. For instance, they allow the licensing of modifiers carrying spatial information about the event. This is true of both episodic and habitual compounds:

- (19) a. The Charlotte and fires brought the number of **church burnings in the South** since 1995 to 32.
- b. The candidate was savoring a rare moment of downtime between **book signings in Texas**.
- c. (...) several New Jersey parents challenged a state law which permitted daily **Bible readings in the public schools**.

- d. Christmas is a special instance of **gift-giving in America**.
- e. House votes to allow **oil drilling in the Arctic National Wildlife Refuge**.
- f. The country expects the government to control **lawbreaking in the hurricane zone**.

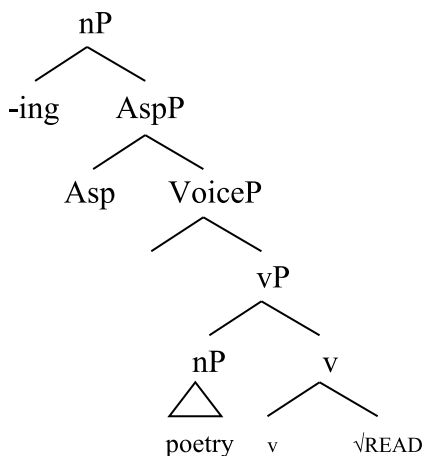
However, episodic and habitual *-ing* compounds behave differently with respect to the ability to appear in aspectual contexts such as after the modifiers *frequent* and *constant* or in environments with predicates expressing temporal information about the event (see Snyder 1998). Compounds denoting single events can occur in such contexts without restrictions whereas habitual *-ing* compounds are generally prohibited in complex event environments although they do tend to allow the licensing of *frequent* and *constant*:

- (20) a. frequent/constant tea drinking
 - b. frequent/constant rule breaking
 - c. frequent/constant risk taking
 - d. frequent/constant book burnings
 - e. frequent/constant poetry readings
 - f. frequent/constant film showings
- (21) a. *The tea drinking took 4 hours.
 - b. *The rule breaking finished this week.
 - c. *The risk taking lasted a month.
 - d. The book burning happened yesterday.
 - e. The poetry reading continued until midnight.
 - f. The rocket launching occurred on Monday.

Thus, episodic *-ing* compounds appear to be more eventively complex than habitual *-ing* compounds. Importantly, the ability to occur in the environment with verbs such as *occur* or *happen* is also exhibited by Grimshaw's simple event nominals (e.g. *Her first research trip occurred after she completed The Valley of Horses*), which confirms that nominals such as *trip* and compounds of the *poetry reading* type belong to the same category and are structurally complex.

The syntactic behaviour of synthetic *-ing* compounds allows us to propose a structure for nominal *-ing* compounds containing both the VoiceP and AspP projections.

(22) poetry reading



It is unclear whether AspP should also be projected in the structure of habitual deverbal compounds which are heavily restricted in aspectual contexts. Also, compounds such as *decision making* or *dog training* are barred from contexts with verbs such as *happen*, *occur* or *last* and they cannot be modified by *frequent*. The question of whether compounds of the *gift-giving* type license the aspectual projection must be left for future research as their syntactic properties lead to conflicting conclusions.

4.3. Compounds based on -ation, -ment and -al nominals

Synthetic nominal compounds can also incorporate a nominal derived from a verb by means of suffixes such as *-ion*, *-ment* or *-al*.⁶ Examples are given in (23):

(23) data collection, alcohol, consumption, revenue generation, class management, risk assesment, career development, snow removal, drug approval, waste disposal

Similarly to their *-ing* equivalents, *-ion*, *-ment* and *-al* compounds project the external argument, which is manifested by their capacity to license *by*-phrases, instrumental phrases and agent-oriented adjectives:

⁶ Eventive nominal compounds can also incorporate the *-ance* and *-er* suffixes (*ground clearance*, *company merger*).

- (24) a. Momentum also has grown in the Illinois General Assembly to mandate **data collection by law enforcement agencies** in our state.
- b. Every time people install a solar system, it means the need for more power distribution is reduced and the need for more **energy generation by utility companies** is reduced.
- c. Class videos that display effective classroom procedures and the use of an organized and safe learning space will provide insight to administrators on the monumental task of **classroom management by a music teacher**.
- d. The question of **risk assessment by international health authorities** thus raises an important problem (...).
- e. This avoided-cost proxy is most plausible for **nitrogen removal by oyster reefs** (...).
- f. **Program approval by NASP** at the specialist level and accreditation by the APA at the doctoral level will result in curricula for school psychologists (...).
- (25) a. (...) it has been shown that these subjects fail to demonstrate this effect of **memory enhancement with aversive, highly arousing stimuli** (...).
- b. Other textile processes include **dye removal with discharge pastes** and dye resists using thick dextrans.
- (26) a. Often ignored are (...) safety issues that are in part common to all events but with the added element of **deliberate alcohol consumption**.
- b. Successful processing of the more challenging text is made possible by an expert teacher's **careful text selection** and strong teaching.
- c. **A careful risk assessment** will establish the itinerary, length of stay, living conditions and endemnicity in the country to be visited.
- d. With **careful image enhancement**, long strings of numbers on the casing were visible enough to decipher.
- e. The cleanup process meant **careful dust removal** from furniture without scratching.
- f. **Careful waste disposal** and appropriate segregation are important for infection control and the environment.

Compounds based on *-ion*, *-ment* and *-al* nominals can pluralize and be preceded with an indefinite article, which means that they can be used to denote a single event. The exception to that are certain compounds incorporating the suffix *-ion* such as *alcohol consumption* or *energy generation*.

- (27) a. The real stench here is coming from the Capitol, where a sitting governor was able to cloak his efforts to strong-arm the ethics commission into dismissing numerous complaints detailing rather blatant ethics violations by the Deal campaign (...).
- b. School psychologists are in a unique position to use their assessment and consultation expertise to assist classroom teachers and other school professionals in a thorough and functional analysis of a wide range of **classroom managements**.
- c. Part of the problem, Rice noted, is that healthcare organizations and medical device manufacturers don't perform penetration testing or other regular **risk assessments** of their systems with any regularity.
- d. **Product developments** have been bringing solar arrays' costs down precipitously, and could make this worldwide solar infrastructure affordable by the 2020s, he argued.
- e. Stanley and other researchers have studied the release of water following the destruction of small dams in Wisconsin, one of the leading states in **dam removals**.
- f. SoftBank's charismatic founder Masayoshi Son has said the company had raised nearly 2 trillion yen (\$19 billion) in cash over the last few months through **asset disposals** (...).
- g. Over the last decade, growth in alcohol consumption/*alcohol consumptions has outpaced the ability of producers to meet that demand with more production.
- h. Scientists propose new area of study in energy generation/*energy generations.
- (28) a. While many readers might struggle with the idea that history shifts depending on context, few would deny that **a murder investigation** involves finding clues within the stories of witnesses and suspects.
- b. The ambitious plan Carol and I hatched meant **a course adjustment** in the middle of the school year.
- c. Such **a policy reversal** would be seen as inexplicably inconsistent by those nations whom we have urged to refrain from such sales (...).
- d. *a power generation/data collection/skin irritation

Interestingly, *-ion/-ment/-al* compounds, including compounds which do not pluralize, appear to be possible in aspectual contexts: they can co-occur with *frequent* and *constant* as well as function as the subject of verbs which place the event in time.

- (29) a. frequent alcohol consumption/risk assessment/waste disposal/snow removal

- b. constant job creation/skill development/waste disposal
- c. The data collection/power generation/job creation lasted 2 months.

Compounds such as *data collection*, *power generation* or *job creation* are restricted from pluralization due to the blocking effect of the countable variants of their head nominals which have specific, referential meanings;⁷ nevertheless, they can denote a single event. We then believe that *-ion/-ment/-al* compounds correspond to episodic *-ing* compounds, the only exception being compounds based on mass nominals without a countable variant such as *consumption*, which are not licit in aspectual contexts (**The alcohol consumption lasted 6 months*) and in turn behave similarly to compounds of the *decision-making* type.

4.4. Nominal *-ing* compounds as prenominal modifiers – an argument against their structural complexity?

Synthetic *-ing* compounds commonly appear in the prenominal position functioning as a modifier of the following noun, as in the examples quoted below:

- (30) a. Everything in life is based on a **decision making process**.
- b. Behavior, including **rule-breaking behavior**, is endowed with meaning and regulated by commonsense notions that provide order and regularity.
 - c. Humans are a **risk-taking species**.
 - d. It looked like some college dorm room had collided with a **missile-launching site**.
 - e. children who may never see or hear about a kangaroo in their daily experiences learn the word kangaroo and information about this animal through a **book-reading experience**.
 - f. An attribution carried an importance far beyond the moment of exchange in a **gift-giving economy**, for the gift was the materialized expression of the relationship between giver and receiver.

The question arises whether the fact that synthetic *-ing* compounds can modify nouns can be considered to be indicative of the lack of their structural complexity. To answer this question, let us firstly determine the cases of the

⁷ *Data collection* can sometimes be used eventively, as in the below sentence extracted from <http://www.bristol.ac.uk/news/2016/april/teachers-mental-health.html>:

- (i) The trial started on Dec 1 2015, with the first data collections in June 2016, final follow up data collections in June 2018, and an official end date of April 2019.

co-occurrence of synthetic *-ing* compounds and simple adjectives.⁸ Synthetic *-ing* compounds resist the coordination with other adjectives as evidenced by the impossibility of examples such as those in (31) below:⁹

- (31) a. *complex and decision-making process
 b. *sophisticated and book-reading person

Synthetic *-ing* compounds appear to accept the prefixation with *non-*, which might be indicative of their adjectival status:¹⁰

- (32) a. No stakeholder committee was set up for this project, and the work redesign team was set up to be a **non-decision-making** body.
 b. To get a great deal, celebrate Christmas in the **non-gift-giving** months of July and August.
 c. Review of literature shows different reasons of book reading and **non-book reading** habits ranging from the age.

As is maintained by Bruening, however, *by-*phrases are licensed with negated participles, which points to their verbal status (Bruening 2014: 379).

⁸ Coordination with adjectives has been employed to diagnose, for example, the adjectival status of participles (McIntyre 2013).

⁹ Otherwise, synthetic *-ing* compounds are common with adjectives:

- (i) a. Our goal is to bring order to a **complex decision-making process** that must match all levels of technology to personal needs and abilities.
 b. Physical education classes offer the possibility for **positive risk-taking opportunities**, as opposed to **negative risk-taking behaviors**, provided the youth feel comfortable and accepted in these classes.
 c. Countries with **strong gift-giving routines** may be very poor at charitable giving (...).

The above sentences feature adjectives subject to ordering constraints. In every example above, the left-most adjective modifies the entirety of the following noun phrase and not only the head noun. This becomes apparent when we attempt to reverse the order of the modifiers, which results in ungrammaticality:

- (ii) a. *decision-making complex process
 b. *risk-taking positive opportunities
 c. *gift-giving strong routines

¹⁰ The licensing of negating prefixes has been shown to be yet another characteristic pointing to adjectival nature of deverbal adjectives. Notably, Wasow (1977) reports that only adjectival (and not verbal) passives accept *un-*prefixation:

- (i) a. Harry is unbeaten.
 b. Harry is unhappy.
 c. Harry is being beaten (by his opponent).
 d. *Harry is being unbeaten.

- (33) a. Biden's optimism undisturbed by Iraqi bombs.
 b. Toddler unfazed by lion encounter.
 c. Former investigator says he remains undisturbed by what he saw at baby murder scene.

The data above indicate that prenominal *-ing* compounds cannot be viewed as simple adjectives, lacking any structural complexity. Other diagnostics seem to point to the same conclusion. For example, synthetic *-ing* compounds, with very few exceptions,¹¹ disallow the modification with adjectival degree modifiers such as *very*:¹²

- (34) a. ??very decision-making
 b. ??very book-reading
 c. ??very truck-driving

Furthermore, synthetic *-ing* compounds cannot appear in the predicative position after copular verbs:

- (35) a. ??This unit is decision-making.
 b. ??John appears book-reading.
 c. ??John seems gift-giving.

The ability of deverbal formations to co-occur with copular verbs is taken to be indicative of their adjectival nature (Wasow 1977, Anagnostopoulou 2003, Gehrke 2011, McIntyre 2013). While the same has been claimed of the ability to

¹¹ A small subset of synthetic *-ing* compounds, such as *risk-taking* or *gift-giving*, are licit with *very*:

- (i) a. John is a very risk-taking man.
 b. Christmas is a very gift-giving period.

The ability of *risk-taking* and *gift-giving* to license *very* can be accounted for by postulating that the compounds in question express properties of the modified subjects, rather than any actual events. Note that *risk-taking* and *gift-giving* become possible postnominally in the presence of *very*:

- (ii) a. *John is risk-taking.
 John is very risk-taking.
 b. *Christmas is gift-giving.
 Christmas is very gift-giving.

This adjectival reading of *gift-giving* and *risk-taking* is further confirmed by the fact they can be coordinated with other adjectives, unlike most nominal *-ing* compounds (*a generous and gift-giving person, an ambitious and risk-taking artist*).

¹² The modification with *very* has been widely understood to be a typical adjectival feature, as reported by e.g. Kennedy and McNally (1999), who note that *very* cannot modify true verbal participles:

- (i) ??The president was very impeached by the House of Representatives. (Kennedy and McNally 1999: 164)

appear in the attributive position (Meltzer-Asscher 2011), it has been shown that prenominal adjectives can be fully eventive. As reported by Sleeman (2011), for example, adjectival participles in Dutch may license *by*-phrases and instrumental phrases (Sleeman 2011: 1574):

- (36) a. de door Jan geopende brief
 the by John opened letter
 ‘the letter opened by John’
 b. de met een sleutel geopende deur
 the with a key opened door
 ‘the door opened with a key’

In light of these facts, the ability of synthetic *-ing* compounds to function as prenominal modifiers and to accept the prefixation with *non-* cannot be taken as an argument against their structural complexity, which is further evidenced by the fact that they are illicit in the postnominal position and that they cannot licence adjectival degree modifiers.

5. Concluding remarks

In this paper we have argued that nominal synthetic *-ing* compounds fall into two categories (which we have labelled episodic and habitual). Their syntactic features are summarized in (37) below.

- | | | |
|------|--|--|
| (37) | episodic <i>-ing</i> compounds
may refer to a single event
no article restrictions
may be pluralized
external argument present
complex event structure | habitual <i>-ing</i> compounds
may not refer to a single event
indefinite article prohibited
do not undergo pluralization
external argument present
event structure restricted |
|------|--|--|

We have established that both types of *-ing* compounds can function as prenominal modifiers which are of highly verbal in nature due to their inability to appear in typical adjectival environments. Crucially, we have shown that, contrary to what has been claimed in the literature, both types of synthetic *-ing* compounds offer extensive evidence for the presence of the external argument in their structure such as the licensing of *by*-phrases, instrumental phrases and agent-oriented modifiers. Additionally, the external syntax of synthetic *-ing* compounds (especially those of the episodic type) is indicative of a high level of their eventive complexity, which is manifested by their ability to co-occur with a wide range of spatio-temporal modifiers.

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