

Arguments and Adjuncts in Universal Dependencies

Adam Przepiórkowski

Institute of Philosophy
University of Warsaw *and*
Institute of Computer Science
Polish Academy of Sciences
ul. Jana Kazimierza 5
01-248 Warszawa, Poland
adamp@ipipan.waw.pl

Agnieszka Patejuk

Institute of Computer Science
Polish Academy of Sciences
ul. Jana Kazimierza 5
01-248 Warszawa, Poland
aep@ipipan.waw.pl

Abstract

The aim of this paper is to argue for a coherent Universal Dependencies approach to the core vs. non-core distinction. We demonstrate inconsistencies in the current version 2 of UD in this respect – mostly resulting from the preservation of the argument–adjunct dichotomy despite the declared avoidance of this distinction – and propose a relatively conservative modification of UD that is free from these problems.

1 Introduction

Universal Dependencies (UD; Nivre et al. 2016) has recently become a *de facto* standard for the representation of dependency treebanks. An important feature of UD is that it attempts *not* to represent the argument–adjunct distinction. This is stated explicitly in the paper introducing UD (Nivre et al. 2016: 1661): “The scheme [...] makes a distinction between core arguments (e.g., subject and object) and other dependents, but does not attempt to distinguish complements vs. adjuncts” (recall that *complements* are non-subject arguments), and it is confirmed on the current official UD webpage:¹ “[The UD taxonomy] does not make a distinction between adjuncts (general modifiers) versus oblique arguments (arguments said to be selected by a head but not expressed as a core argument).” This decision is not justified in Nivre et al. 2016, but it is briefly motivated on the UD webpage (cf. fn. 1): “[T]he argument/adjunct distinction is subtle, unclear, and frequently argued over. For instance, syntacticians at certain times have argued for various obliques to be arguments, while at other times arguing that they are adjuncts, particularly for certain semantic roles such as oblique instruments or sources. We take the distinction to be sufficiently subtle (and its existence as a categorical distinction sufficiently questionable) that the best practical solution is to eliminate it.”

This view goes against the theoretical-linguistic received wisdom – linguistic theories invariably assume a fundamental argument–adjunct dichotomy (AAD). However, it has been repeatedly observed that AAD has been flawed ever since its conception: the three criteria for distinguishing arguments from adjuncts given by Tesnière (1959) – the father of modern valency theory – are pairwise incompatible (Vater 1978a, 1978b, Przepiórkowski 1999). Multiple tests proposed since then have often been inconsistent with linguists’ intuitions about AAD (and with each other) and short-lived; as cautiously noted by Tunjjan and Boland (2008, 633), “[t]he sheer number of [purported argument/adjunct] tests underlines the fact that no single test is entirely satisfactory”. The existence of such a universal dichotomy is also called into doubt by typologists (see, e.g., Croft 2001: 272–280 and Haspelmath 2014). We have argued recently that even those theories which put much emphasis on the argument–adjunct distinction have not proposed any operational way to distinguish these two classes (Przepiórkowski 2016a, 2017b). On the constructive side, we have demonstrated that a relatively modest modification of some assumptions of Lexical Functional Grammar (LFG; Bresnan 1982, Dalrymple 2001, Bresnan et al. 2015) results in a theory that does not assume AAD at any level of representation and in any theory-internal mechanisms

¹This work is licensed under a Creative Commons Attribution 4.0 International Licence.
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¹<http://universaldependencies.org/u/overview/syntax.html>; all web pages cited here were last accessed on 12 March 2018.

(Przepiórkowski 2016b, 2017a; Patejuk and Przepiórkowski 2016). This means that neither syntax nor compositional semantics necessarily presuppose AAD. Hence, given that AAD is both non-operational and unnecessary, the avoidance of AAD is a very attractive feature of UD, one that should be consistently implemented and preserved.

Unfortunately, UD does not consistently follow the policy expressed in the quotes evoked at the beginning of this section. The main aim of this paper is to identify those aspects of UD which do preserve AAD and to propose a modified version of the current standard which consistently eschews this ill-defined dichotomy. In particular, we demonstrate that the presence of some vestiges of AAD in UD results in serious inconsistencies in the current classification of dependents as core or non-core – a dichotomy which is fundamental for UD.

2 Argument–Adjunct Dichotomy in UD

The declared UD avoidance of any reference to AAD is consistently implemented in the case of broadly nominal (that is, also prepositional) dependents of verbs. For example, in the case of English, nominal subjects (`nsubj`) may be defined as those dependents which agree with verbs, nominal objects (`obj`) – as those bare nominal (NP) dependents which normally occur immediately after the verb, and nominal indirect objects (`iobj`) – as those NP dependents which normally occur immediately after the direct object. The actual UD definitions of `nsubj`, `obj` and `iobj` are different and somewhat internally inconsistent (cf. §4.2), but the point remains that no reference to AAD is made here. All other broadly nominal non-predicative dependents – including prepositional (PP) dependents – are classified as obliques (`obl`). This way the phrase *at the restaurant*, when it is a dependent of a (non-copula) verb, is always marked as oblique, whether it is an argument (e.g., *I looked at the restaurant*) or an adjunct (e.g., *I fell at the restaurant*) according to the advocates of AAD. Hence, there is no argument–adjunct dichotomy lurking in the process of deciding whether a typical broadly nominal dependent of a verb is core or non-core. Below we will show that the situation is very different in the case of clausal dependents of verbs – both ‘closed’ (usually finite) and ‘open’ (controlled, often infinitival) – and in the case of secondary predicates.

2.1 Closed Clausal Dependents

Ordinary (non-controlled) subordinate clauses which are dependents of verbs are marked in UD either as `csbj`, if they are subjects, or as `ccomp`, if they are not subjects but should still be classified as core, or as `advcl`, if they are non-core. Let us assume that it is possible to recognise `csbj` dependents (e.g., in English, as immediately pre-verbal clauses), but how should other clausal dependents be split into core (i.e., `ccomp`) and non-core (i.e., `advcl`)? Current guidelines do not make this clear, saying the following about `ccomp`: “A clausal *complement* of a verb or adjective is a dependent clause which is a core argument. That is, it functions *like an object* of the verb, or adjective”² (emphasis ours). The first sentence, making reference to the notion of *complement* (i.e., non-subject argument), explicitly relies on AAD: complement clauses are marked as `ccomp`, adjunct clauses – as `advcl`. The second sentence, making reference to the notion of *object*, could in principle avoid AAD, if there were independent criteria of deciding when a clausal dependent “functions like an object”. Since no such criteria are provided in UD guidelines, UD practitioners implicitly rely on AAD and classify dependent clauses as `ccomp` when they seem to be (non-subject) arguments, and as `advcl` – when they seem to be adjuncts.

It might seem then that both sentences have the same effect, but in fact they differ. On the first – broader – view, complement clauses are treated as core, but they are not necessarily assumed to be objects. That is, it is possible for a single head to have an `obj` dependent and a `ccomp` dependent. On the second – narrower – view, complement clauses are (direct) objects, so – given that a head may have at most one (direct) object dependent – it is not possible for a single head to have both an `obj` dependent and a `ccomp` dependent. In fact, such a check is implemented in the UD validating script, UDAPY, and the accompanying validation web page states this explicitly: “No predicate can have more than one direct object. Ccomp counts as direct object.”³

²<http://universaldependencies.org/u/dep/ccomp.html>

³<http://universaldependencies.org/svalidation.html>

Both approaches are found in UD (release 2.1) treebanks. The broader view is implemented, *inter alia*, in the Latvian LVTB treebank and in the English EWT treebank (the latter henceforth abbreviated to UD_{EWT}^{EN}), where in both cases about 1% of utterances contain a head with an *obj* and a *ccomp* dependent; one of the 160 such cases in UD_{EWT}^{EN} is:

(1) Apparently the City *informed* [them]_{obj} [that no permit is required]_{ccomp}.

On the other hand, some treebanks – including the Finnish TDT treebank and the Polish SZ treebank (UD_{SZ}^{PL}, for short) – take the stronger position: if two dependents compete for the status of the direct object, only one of them may be labelled as *obj* or *ccomp*, and the other one is given the status of indirect object, *iobj*. As indirect objects are assumed to be nominal, never clausal, *ccomp* always wins the competition for the direct object status, so the nominal is marked as *iobj*. But this has very unwelcome consequences, as it forces some most prototypical direct objects to be reanalysed as indirect objects only because the verb also subcategorises for a clause. This is illustrated with example (2) from UD_{SZ}^{PL}, where the verb *spytało* ‘asked’ combines with the numeral subject *kilka osób* ‘several people’, the accusative nominal *mnie* ‘me’ and the subordinate clause *czy jestem...*, lit. ‘whether I am...’.

(2) *Kilka osób spytało* [mnie]_{iobj}, [czy jestem dzięki feminizmowi szczęśliwsza]_{ccomp}.
 several people asked me.ACC whether am thanks feminism.DAT happier.NOM
 ‘Some people have asked me whether feminism made me happier.’

Since the subordinate clause is marked as *ccomp*, *mnie* ‘me’ must be (and is) marked as an indirect object, *iobj*, contrary to linguistically motivated definitions of direct objects in Polish. On the view prevailing in contemporary grammars of Polish, the only reasonable definition of direct objects in Polish is as those dependents which become subjects under passivisation – and *mnie* ‘me’ above satisfies this definition. A more traditional view refers to accusative bare nominal complements – and *mnie* ‘me’ satisfies this definition as well. In fact, when the same verb, *SPYTAĆ* ‘ask’, occurs in UD_{SZ}^{PL} with an accusative complement but without a clausal complement, the accusative nominal is marked as *obj*, as in the following sentence:

(3) *Chciał* [ją]_{obj} *spytać* [o wiele rzeczy]_{obl}.
 wanted her.ACC ask.INF about many things
 ‘He wanted to ask her about many things.’

Note that *mnie* ‘me’ in (2) and *ją* ‘her’ in (3) bear exactly the same semantic role with respect to the two forms of the verb *SPYTAĆ* ‘ask’ and have the same grammatical properties (passivisability, grammatical case, etc.), so this is a clear case of intra-linguistic annotation inconsistency.

One line of defence could be that there are two valency frames for *SPYTAĆ* ‘ask’ witnessed in these two examples and that the accusative complement – while having the same semantic role – is assigned different grammatical functions in these frames. Consider, however, the attested⁴ example (4), which involves a coordination of a nominal dependent with the preposition *O* ‘about’ and a clausal dependent with the complementiser *CZY* ‘whether’. Such examples make it clear that the accusative phrases in (2)–(3) occupy the same position within the same valency frame, in which another position may be realised either as a subordinate clause, as in (2), or as a prepositional phrase with the preposition *O* ‘about’, as in (3), or as a coordination of such two realisations, as in (4).^{5,6}

(4) ...*należy* *więc spytać* [lekarza]_? [[*o* rekomendowane leczenie]_{obl} i [czy
 ought.IMPS so ask.INF doctor.ACC about recommended treatment and whether
 można się spodziewać wypadania włosów]_{ccomp}].
 may.IMPS RM expect falling_out hair
 ‘... so one should ask the doctor about the recommended treatment and whether one should expect hair to fall out.’

Let us summarise. Two views on what it means to be a (non-subject) core clausal dependent are present

⁴http://www.handsomemen.pl/wlosy,lysienie,wypadanie_wlosow_u_dzieci.html

⁵Since the accusative dependent of *SPYTAĆ* ‘ask’ is claimed to be *iobj* in (2) and *obj* in (3), it is not clear – on the approach discussed here – what its label should be in (4); hence the question mark.

⁶Note that, unlike in the English translation, the second conjunct cannot be analysed as a dependent of the preposition *o* ‘about’.

in UD guidelines. The broader view makes an explicit reference to AAD and defines `ccomp` as any non-subject clausal argument. The narrower view defines `ccomp` as a clausal object, but – given the lack of an independent definition of such clausal objects – this also boils down in practice to assuming AAD and treating all non-subject clausal arguments as `ccomp`. Moreover, the narrower view, as currently implemented, is linguistically naïve and leads to violations of annotation consistency. In §4, we propose a solution that may be viewed as a variant of the narrower view, but one that does not make reference to AAD and does not lead to annotation inconsistencies.

2.2 Open Clausal Dependents

While `ccomp` marks non-subject ‘closed’ clausal arguments, `xcomp` is used, *inter alia* (see §2.3 below), to label so-called ‘open’ non-subject core clauses, i.e., clausal dependents with obligatorily controlled subject, as in the English example from UD_{EW^{EN}T}: “So [Bush]_{nsubj} stopped [flying]_{xcomp}.” Just as in the case of `ccomp`, the `xcomp` relation is understood differently in different treebanks. In UD_{EW^{EN}T}, `xcomp` dependents are again understood broadly, as any open complements, and they do not compete with prototypical direct objects. For example, *asked* in the following (partial) sentence has an `obj` dependent and an `xcomp` dependent: “I asked [them]_{obj} [to change it]_{xcomp}...”. On the other hand, in UD_{SZ^{PL}}, the prototypical (passivisable, accusative) direct object *je* ‘them’ of the verb *uczq* ‘teach’ in (5) is marked as an indirect object, probably due to the presence of an `xcomp` dependent of the same verb, which wins the competition for the direct object position:

- (5) ...*uczq* [je]_{iobj} [zjeżdżać na racicach]_{xcomp}.
 teach.3.PL them.ACC slide.INF on hooves
 ‘... they teach them to slide on their hooves.’

Again, in both cases reference is made to AAD: non-subject open dependents are marked as `xcomp` if they are arguments, and as `advcl` – if they are adjuncts. And, again, the narrower view goes against the linguistically-motivated definitions of *direct object* and results in annotation inconsistency, as illustrated by (6), where the corresponding (passivisable, accusative) dependent *nas* ‘us’ is marked as a direct object, `obj`, while the `iobj` label is used for the taught material, *tego* ‘this’ (which semantically corresponds to the `xcomp` dependent *zjeżdżać na racicach* ‘slide on hooves’ in (5)).

- (6) [Tego]_{iobj} [nas]_{obj} *ucz*y [Boże Słowo]_{nsubj}.
 this.GEN us.ACC teach.3.SG god’s.NOM word.NOM
 ‘God’s Word teaches us that.’

Note that, unlike in the case of ‘closed’ clausal dependents, a different label (`xcomp` vs. `advcl` here, `ccomp` vs. `advcl` there) is not the only difference between the two analyses. If an ‘open’ clausal dependent is analysed as core, i.e., as `xcomp`, there is an additional secondary `nsubj` edge in the enhanced representation, as in (7). Such a secondary edge is missing if the dependent is analysed as non-core, as in (8). But since core vs. non-core distinction relies on AAD, this means that the structure of the resulting dependency graph depends on the dichotomy that UD claims to eschew.

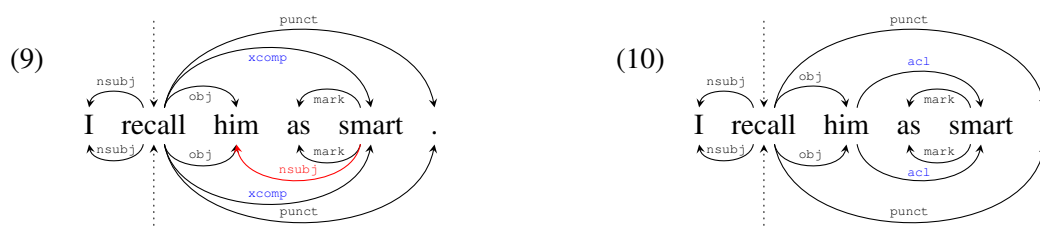


2.3 Secondary Predicates

Finally, AAD is also preserved in UD in the treatment of secondary predicates, as in the English “I recall him as smart and genial” (from the iWeb corpus, <https://corpus.byu.edu/iweb/>). Should the depictive dependent, *smart and genial*, be analysed as an argument of *recall*, or as its adjunct? Valency dictionaries do not agree about this (see Appendix A). As is made clear in the description of the `xcomp` label,⁷ secondary predicates analysed as arguments are `xcomp` dependents of the verb, with an enhanced

⁷<http://universaldependencies.org/u/dep/xcomp.html>

nsubj relation to the nominal they predicate of, as in (9). However, those analysed as adjuncts are *acl* dependents of the nominal elements they predicate of, as in (10).



Moreover, if the subject of predication is missing or realised non-locally, as in “(This is the man) I recall as smart”, the secondary predicate is still an *xcomp* dependent of the verb, if it is analysed as an argument (cf. (11)), but it is marked with a third dependency label, *advcl*, if it is analysed as an adjunct (cf. (12)). Hence, in the case of secondary predicates, the resulting structures depend on the ill-defined AAD even more than in the case of ‘open’ clausal dependents, again, despite the declared avoidance of this dichotomy in UD.



2.4 Summary of AAD in UD

While UD avows to forsake AAD, the core vs. non-core distinction boils down to the argument–adjunct dichotomy at least in the case of clausal dependents of verbs – both ‘closed’ (clausal, often finite) and ‘open’ (controlled, often infinitival) – and in the case of secondary predicates. While this dichotomy is vague and controversial, the resulting dependency representations differ sharply, depending on the classification of the relevant constituent as an argument or an adjunct. The following section shows that these vestiges of AAD in UD also make it impossible to coherently classify certain dependents as core or non-core.

3 Core vs. Non-Core Distinction in UD

The fact that non-subject core *nominal* dependents are understood very narrowly – as bare nominal direct objects and perhaps indirect objects – while non-subject core *clausal* dependents may be understood more broadly – as any clausal complements – leads to some serious inconsistencies.

Consider the verb *ASK*. In sentences such as “We asked the president about the hunt for Osama bin Laden”, the prepositional phrase *about the hunt for Osama bin Laden* will receive the *obl* – i.e., non-core – dependency label (this is the annotation of such dependents of *ASK* in UD_{EW^{EN}}_T). On the other hand, in the sentence “We asked the president whether Americans are safe at home”, the subordinate interrogative clause, being an argument, is a core dependent, so it will be annotated as *ccomp* (again, this is the annotation of such subordinate clause dependents of *ASK* in UD_{EW^{EN}}_T). If so, what is the coreness status of the coordinate dependent of *asked* in the following example from the iWeb corpus?

(13) At the White House, we *asked* the president [[whether Americans are safe at home]_{ccomp} and [about the hunt for Osama bin Laden]_{obl}].

At the moment, UD’s reply is inconsistent: the broadly nominal second conjunct of this coordinate structure is a non-core dependent of the verb, and the clausal first conjunct is a core dependent of the verb. On the natural assumption that whole dependents should be classified as core or non-core (see Appendix B), and that the coordinate structure *whether Americans are safe at home and about the hunt for Osama bin Laden* is such a dependent of *asked*, the coreness status of this dependent is incoherent.

It is easy to provide an arbitrary technical solution of this conceptual problem: the coreness of a coordinate dependent could be resolved by fiat to the coreness of the first conjunct. So, in (13), the coordinate structure would be ruled as core, given that the first conjunct is a *ccomp* – i.e., core – dependent

of *asked*. The arbitrariness of this technical solution is made clear by the fact that, by adopting it, the coreness of a coordinate structure depends on the order of conjuncts. Thus, in “We asked the president about the hunt for Osama bin Laden and whether Americans are safe at home”, the coordinate dependent would be classified as non-core, because the first conjunct is now an *obl* dependent of *asked*.

This problem is not limited to dependents of ASK; similar examples may be found in corpora, which involve other heads and other kinds of coordinated dependents, including the following, again from iWeb:

(14) Dennis is an important voice of moderation who *worries* [[whether Colorado has adequate water reserves]_{ccomp}, and [about the future of family farms]_{obl}].

(15) Mr. Bernhardt *told* him [[about the "mediandise" virus]_{obl} and [that Adrian's blood analysis showed that he was virus free]_{ccomp}].

(16) We *counsel* them [[about the dangers of giving birth]_{obl} and [that their baby might be born infected]_{ccomp}].

Neither is the problem limited to English; a Polish example of this kind is in fact given above – see (4). There, the prepositional oblique (non-core) dependent *o rekomendowane leczenie* ‘about recommended treatment’ of the verb *spytać* ‘ask’ is coordinated with the clausal (core) dependent *czy można się spodziewać wypadania włosów* ‘whether one should expect hair to fall out’.

Similar inconsistency involves *xcomp* dependents: they are core, but they may fill the same position as non-core dependents, as in the following attested⁸ example:

(17) Campbell made two visits to the home of domestic abuse victim Miss A, during which he *asked* her [[for a kiss]_{obl} and [to go on a date with him]_{xcomp}].

Again, *for a kiss* would currently be classified as a non-core *obl* and *to go on a date with him* is a typical *xcomp* (also in UD_{EN}^{EW}_T), i.e., a core dependent, so the status of the coordinate phrase as a core or non-core dependent of *asked* is inconsistent.

4 Proposal

4.1 Basic Idea

The basic idea follows directly from the discussion of the previous sections. Since there are no generally accepted objecthood criteria of clausal dependents of verbs, only those clausal dependents should be treated as objects which may be coordinated with nominal – i.e., uncontroversial – objects. Similarly, clausal dependents which may be coordinated with broadly nominal obliques – especially, prepositional phrases – should be classified as non-core. On this approach, the clausal dependent of the Polish verb SPYTAĆ ‘ask’, as in (2), where it is marked as *ccomp*, should be classified as non-core, because it may be coordinated with a prepositional oblique, as in (4). (Note that the obstacle to treating the passivisable accusative *mnie* ‘me’ in (2) as a direct object would then disappear.) Similarly, given coordination facts such as (13), the clausal dependent of the English ASK in constructions involving an NP object (cf. *the president* in (13) and in its variants discussed in the main text) would also be classified as non-core, as it may also be coordinated with a prepositional oblique. The same holds for appropriate ‘closed’ clausal dependents of verbs in (14)–(16). Also some ‘open’ dependents, hitherto marked as *xcomp*, would have to be classified as non-core, on the basis of data such as (17).

The question arises whether, on this approach, there are any clausal dependents left that would have to be classified as objects rather than as obliques. The answer is yes: it is clear that some clausal dependents must be analysed as direct objects. Take the following classic example (Sag et al. 1985: 165):

(18) Pat *remembered* [[the appointment]_{obj} and [that it was important to be on time]_{ccomp}].

In the simpler “Pat remembered the appointment”, the NP *the appointment* is an uncontroversial direct object. Hence, the coordinate phrase *the appointment and that it was important to be on time* in the above sentence must also be considered the direct object.⁹ If so, it must be concluded that the direct object position of the verb REMEMBER may be realised as either an NP or a clause. But this in turn

⁸<https://www.liverpoolecho.co.uk/news/liverpool-news/police-officer-attempted-kiss-vulnerable-13615076>

⁹Sag et al. 1985 convincingly argue that unlike category coordination cannot be explained away as ellipsis.

implies that the subordinate clause in “Pat remembered that it was important to be on time” should also be considered a direct object. Note that this conclusion does not lead to undesired consequences of the kind discussed in §§2.1–2.2 above: the NP and the clause do not compete for the status of direct object, as only one of them (or a single coordinate phrase) may occur with REMEMBER: *‘‘Pat remembered the appointment that it was important to be on time’’. Obviously, such constructions are not limited to linguistic papers, as the following examples from the iWeb corpus testify:

- (19) I do *remember* [[a lot of wine bottles]_{obj} and [that Felix spoke almost nothing]_{ccomp}].
 (20) Well, my initial reaction was, I have to *assume* [[the worst]_{obj} and [that he’s really going to take his life]_{ccomp}].
 (21) One guy who had a registered one really didn’t *know* [[the law]_{obj} and [that he had to register the gun in this state]_{ccomp}].

Neither are they limited to English, as illustrated by the following Polish example (from the National Corpus of Polish; <http://nkjp.pl/>; Przepiórkowski et al. 2011, 2012):

- (22) Milena *widzi* [[dewastację]_{obj} oraz [że to coś wyciekające paskudzi
 Milena.NOM sees devastation.ACC and that this something oozing soils
 dywan]_{ccomp}]. . .
 carpet
 ‘Milena sees the devastation and that the oozing thing is soiling the carpet. . .’

Again, the same reasoning may be applied to ‘open’ clausal dependents, *xcomp*, as the following attested examples illustrate:¹⁰

- (23) She *wants* [[a career in virtual reality]_{obj}, and [to perhaps even found her own company]_{xcomp}].
 (24) Homeless people *need* [[a work ethic]_{obj} and [to be self-reliant]_{xcomp}], Bender said.
 (25) He *remembers* [[the cocktail napkins]_{obj}, and [to serve the ladies first]_{xcomp}].

Exactly such constructions in Polish are analysed in Patejuk and Przepiórkowski 2014, on the basis of the classic (Kallas 1993: 123) example (26).

- (26) *Chcę* [[pić]_{xcomp} i [papierosa]_{obj}].
 want drink.INF and cigarette.ACC
 ‘I want to drink and (I want) a cigarette.’

Hence, according to the current proposal, all the examples cited in this section, (18)–(26), show that the relevant heads (marked in italics) may combine with clausal dependents “functioning like objects”.

There are two immediate consequences of this basic proposal. First, since some obligatorily controlled – i.e., ‘open’ – clausal dependents (e.g., the infinitival dependent of some uses of ASK; cf. (17)) are now analysed as non-core, it would be useful to distinguish such ‘open’ oblique clauses from ‘closed’ oblique clauses, just as ‘open’ object-like clauses (*xcomp*) are distinguished from ‘closed’ object-like clauses (*ccomp*). For the time being we retain the label *advcl* for the ‘closed’ oblique clauses and we introduce the label *xadvcl* for ‘open’ oblique clauses. In Appendix C, we provide independent motivation for such ‘open’ obliques, and also for ‘open’ – obligatorily controlled – subjects, called *xsubj* for now. Thus, we propose to extend the repertoire of basic dependents of verbs from (27) to (28).

(27)

	subject	object	non-core
nominal	nsubj	obj/iobj	obl
clausal	csbj	ccomp	advcl
open		xcomp	

(28)

	subject	object	non-core
nominal	nsubj	obj/iobj	obl
clausal	csbj	ccomp	advcl
open	xsubj	xcomp	xadvcl

Second, while some clausal dependents retain their status as core (cf. (18)–(26)), many clausal dependents which are prototypical arguments according to the advocates of AAD will now be analysed as non-core. While this may be perceived as a disadvantage of the current proposal, it is in fact its advantage, as it increases the internal consistency of UD: the treatment of broadly nominal dependents is

¹⁰The first example is taken from <https://www.usatoday.com/story/sponsor-story/xq/2017/04/03/high-school-wants-revolutionize-learning-technology/99985812/>, the other – from the iWeb corpus.

fully analogous. There, only very few of traditional arguments are assigned the status of core dependents: subjects, bare nominal direct objects and perhaps bare nominal indirect objects. The whole class of prototypical – but prepositional – arguments, as in “*wait* [for somebody]_{obl}”, “*rely* [on somebody]_{obl}”, “*nibble* [at something]_{obl}”, etc., is relegated to obliques, together with prototypical adjuncts.¹¹ We see no reason not to adopt the same solution in the verbal domain: apart from closed and open subjects (*csubj*, *xsubj*) and objects (*ccomp*, *xcomp*), all other clausal dependents should be relegated to the respective classes of ‘clausal obliques’, i.e., *advcl* and *xadvcl*. If this solution seems difficult to accept at first, it is only because of the unfortunate names UD assigns to such ‘clausal obliques’, names which suggest their necessarily adverbial character; in §4.3, we will propose a more adequate naming scheme.

Let us take stock of the proposal so far. Unlike in the current UD practice, we propose to take seriously the stance expressed in the UD guidelines that (non-subject) core clausal dependents “function like an object” and mark as *ccomp* and *xcomp* only those ‘closed’ and ‘open’ clausal dependents which may be coordinated with uncontroversial – nominal – objects. The other (non-subject) ‘closed’ and ‘open’ clausal dependents should be marked as *advcl* and *xadvcl* (but see §4.3 below). But apart from making precise the recommendation that (non-subject) core clausal dependents should “function like objects”, this proposal has a number of other advantages. First, it removes explicit and implicit references to AAD in the treatment of clausal dependents of verbs. Second, it is free from inconsistency problems with the previous narrow understanding of core clausal dependents (nominal direct objects reanalysed as indirect objects because of the presence of a clausal dependent). Third, it is free from the problem of the incoherent coreness status of certain coordinate dependents.

4.2 Direct and Indirect Objects Revisited

The above subsection concentrated on obliques and on uncontroversial direct objects. What about indirect objects? Can clausal dependents be coordinated with indisputable indirect objects and, hence, be claimed to “function like indirect objects”? The answer depends on a particular understanding of the distinction between direct and indirect objects. The current UD practice follows the linguistic tradition: indirect objects are those NPs in double object constructions which bear the semantic role of a recipient or a benefactor. Thus, in (29), from UD_{EN}^{EN}_{EWT}, the NP *you* immediately following the verb is the indirect object, and the next NP, *a voice mail*, is the direct object:

(29) I *left* [you]_{iobj} [a voice mail]_{obj} on Friday.

If so, there are probably no clausal dependents that should be analysed as indirect objects – with the possible exception of free relatives, it is difficult to imagine such a clausal dependent bearing the semantic role of a recipient or a benefactor. So, for example, in the attested¹² (30), the ‘closed’ clausal conjunct should be analysed as a direct object, because the nominal conjunct, *balance*, is marked as a direct object (and the preceding NP, *me*, is marked as an indirect object):

(30) Mother Nature *taught* [me]_{iobj} [[balance]_{obj}, and [that regular pattern interrupts can negate radical change]_{ccomp}].

Similarly for the ‘open’ clausal conjunct in the following attested sentence (from Patejuk and Przepiórkowski 2014):

(31) My uncle said to hell with that and *taught* [me]_{iobj} [[karate]_{obj}, and [to fire weapons]_{xcomp}].

However, as is often the case with linguistic tradition, this traditional view confuses different levels of linguistic representation, namely, semantic roles and (syntactic) grammatical functions. As discussed at length in Andrews 2007, grammatical functions correlate with semantic roles, but – in the end – the precise scope of particular grammatical functions must be defined intra-linguistically, on the basis of such ‘coding strategies’ as case marking, agreement and word order, as well as on the basis of diathesis alternations (especially, passivisation). In the case of English, case marking and agreement do not distinguish the two NPs in double object constructions, but word order potentially does: on the simplest definition of direct objects – as those NPs which necessarily (apart from well-defined constructions, such

¹¹Similarly in the case of arguments which are not nominal or clausal at all, as in “behaving *in some way*” or “treating somebody *in some way*”; they are assigned the *advmod* label (also in UD_{EN}^{EN}_{EWT}, despite being arguments on most accounts).

¹²<http://thedeliverymag.com/10-things-mother-nature-taught-me-about-motherhood/>

as topicalisation, heavy NP shift, etc.) immediately follow the verb – it is the pronoun *me* that should be analysed as the direct object in the two examples above. This stance is strongly supported by another grammatical property that such initial – immediately post-verbal – NPs in ditransitive constructions share with prototypical direct objects in monotransitive constructions, namely, they normally passivise in all varieties of English, unlike the non-initial NPs, which passivise only in some varieties and under certain conditions: “I was taught balance by Mother Nature” vs. %“Balance was taught me by Mother Nature” (where % indicates limited acceptability). Hence, as also argued in Andrews 2007: 184–188 with reference to passivisation facts, it is the first post-verbal NP – the recipient or benefactor – that should be considered the direct object in double object constructions in languages such as English.

Note that the UD guidelines are actually inconsistent about the status of the immediately post-verbal NP in double object constructions. While the fragment on indirect objects¹³ defines them with reference to the semantic roles of recipient and benefactive, the fragment about direct objects¹⁴ defines a (direct) object as “[t]ypically, [...] the noun phrase that denotes the entity acted upon or which undergoes a change of state or motion (the proto-patient).” These two definitions are often in conflict, as in the case of “My uncle taught me karate”, where *me* is a much better candidate for the recipient or benefactive role than *karate*, so it should be classified as *iobj*, but it is also clearly an “entity acted upon”, “which undergoes a change of state”, so it should be classified as *obj*.

Given the arguments in Andrews 2007 and the inconsistency of current UD guidelines, we assume that the immediately post-verbal NP in English double object constructions is the direct object. Unfortunately, Andrews is not very clear about the status of the NP following the direct object, but he generally denies the possibility of indirect objects in English: “In English, Bantu, and many other languages. . . , we do not seem to find even *prima facie* plausible candidates for an indirect object grammatical relation” (Andrews 2007: 190). If so, perhaps the notion of core dependents should be limited to subjects and (direct) objects, and all other broadly nominal dependents – not only PPs but also the NPs following direct objects – should be treated as oblique. In fact, within LFG, this view is argued for in Alsina 1996 and Patejuk and Przepiórkowski 2016. On this view, the above two examples should be labelled as follows:

(32) Mother Nature *taught* [*me*]_{obj} [[*balance*]_{obl}, and [*that regular pattern interrupts can negate radical change*]_{advcl}].

(33) My uncle said to hell with that and *taught* [*me*]_{obj} [[*karate*]_{obl}, and [*to fire weapons*]_{xadvcl}].

Constraining cores to subjects and normally immediately post-verbal direct objects would also explain the following facts (Nathan Schneider, p.c.), otherwise somewhat awkward for the basic proposal presented in the previous subsection:

(34) He *told* [*me*]_{obj} [[*an idea*]_{obl} and [*that he thought it was viable*]_{advcl}].

(35) He *told* [*me*]_{obj} [[*about an idea*]_{obl} and [*that he thought it was viable*]_{advcl}].

The labels indicated in these examples reflect the constrained understanding of cores: in both cases both conjuncts are oblique, so the whole coordinate dependent is oblique. However, on the standard UD view, (34) involves a coordination of a direct object *an idea* and a finite clause, which – for this reason – must also be analysed as core. But (35) indicates that such a finite clause is oblique, as it is coordinated with the oblique *about an idea*. Hence, in the sentence “He told me that the idea was viable”, the clausal dependent should be analysed as core on the basis of (34) and as oblique on the basis of (35). On the view advocated here, this potential problem for the current proposal is avoided: when a post-verbal NP (i.e., the direct object) is present, the following clause is treated as non-core.

In fact, there is additional evidence that there is a valency frame of TELL with a syntactic position which may be realised by an NP, a PP or a clause: not only is it possible to coordinate an NP and a clause, as in (34), or a PP and a clause, as in (35), but it is also possible to coordinate an NP and a PP directly, as in the following examples from the iWeb corpus (simplified here):

(36) I *told* her [[*the story*]_{obl} and [*about my own experiences*]_{obl}].

(37) I . . . *told* them [[*the situation*]_{obl} and [*about the expungement*]_{obl}]. . .

¹³<http://universaldependencies.org/u/dep/iobj.html>

¹⁴<http://universaldependencies.org/u/dep/obj.html>

This supports the decision to treat both realisations – bare nominal and prepositional – as oblique (given that only subjects and direct objects are core).

4.3 Limited Reintroduction of AAD

Of course, any proposal to relegate to the obliques various dependents treated so far as core only increases the sometimes perceived need to distinguish between argument-like obliques and adjunct-like obliques. To accommodate this desire, we propose to adopt a version of the solution presented in Zeman 2017, namely, to optionally subtype non-core dependents into ‘arguments’ – *obl:arg*, *advcl:arg* and *xadvcl:arg* – and ‘adjuncts’ (no *:arg* suffix), but with an important proviso that this subtyping should be optional and treebank-specific. Linguists have not made much progress since Tesnière’s 1959 three pairwise-incompatible criteria, so particular languages and treebanks should be free in applying such subtyping or not and, if so, they should be free in deciding how they understand this distinction.

In summary, we propose the system of basic ad-verbal dependency relations in (38) (complemented by *vocative*, *expl*, etc.). Given the proposal in Appendix C of renaming labels in a way that makes more clear the orthogonality of grammatical function (*subj*, *obj* and *obl*) and grammatical category and ‘openness’ status (*n*, *c*, *x*), this table translates into the more transparent table (39).

(38)

	subject	object	non-core	
			(arg)	adj
nominal	nsubj	obj	obl:arg	obl
clausal	csbj	ccomp	advcl:arg	advcl
open	xsubj	xcomp	xadvcl:arg	xadvcl

(39)

	subject	object	non-core	
			(arg)	adj
nominal	subj:n	obj:n	obl:n:arg	obl:n
clausal	subj:c	obj:c	obl:c:arg	obl:c
open	subj:x	obj:x	obl:x:arg	obl:x

5 Conclusion

In this paper, we identified two rather fundamental problems in the current (version 2) UD schema: reliance on AAD despite declared avoidance of this dichotomy and the resulting inconsistent approach to the core vs. non-core distinction (most conspicuous in unlike category coordination). We aimed at a relatively conservative modification of the schema – cf. (38) and the less conservative but more transparent (39) – that solves these problems, as well as the problem discussed in Appendix C, namely, the lack of support for obligatorily controlled subjects and obliques. The crux of the proposal is the definition of (non-subject) core clausal dependents as “functioning like objects” according to the coordination test. We also considered the possibility of constraining the notion of core dependents to subjects and direct objects, and we accommodated for the proposal of Zeman 2017 to allow for a – treebank-specific – distinction between argument-like and adjunct-like obliques. We strongly believe that adopting these proposals will increase both intra-lingual and inter-lingual consistency of UD treebanks and, hence, of multiple tasks currently relying on dependency parsing.

Acknowledgements

Apart from the three anonymous reviewers, the following people – while not necessarily agreeing with all or any of the proposals in this paper – have provided valuable comments on the previous version of the paper and/or on some of its ideas discussed on the UD forum and at the Oslo Center for Advanced Study at the Norwegian Academy of Science and Letters, during the authors’ fellowship there: Bill Croft, Dan Flickinger, Dag Haug, Sylvain Kahane, Marie-Catherine de Marneffe, Joakim Nivre, Stephan Oepen, Martha Palmer, Nathan Schneider and Amir Zeldes. The research reported here is partially supported by the Polish Ministry of Science and Higher Education within the CLARIN ERIC programme 2016–2018 (<http://clarin.eu/>).

Appendices

A Depictive Dependent of RECALL

The argument/adjunct status of various depictive dependents is perhaps even more controversial than that of other types of dependents. The Valency Dictionary of English (Herbst et al. 2004) mentions the depictive dependent introduced by *as* in the case of the verb REMEMBER (and illustrates it with “I remember her as pretty and sort of tallish”), but not in the case of RECALL. On the other hand, this type of dependent is considered an argument (or core) of both verbs in both FrameNet (Ruppenhofer et al. 2016) (both verbs evoke the `Remembering_experience` frame) and in PropBank (Kingsbury and Palmer 2002) (rolesets `remember.01` and `recall.02`).¹⁵ Moreover, neither dictionary mentions the possibility of an *as*-less depictive in the case of REMEMBER, as in “I look at Macie [...] and try to remember him young” (abridged from the iWeb corpus). Given the level of uncertainty about the argument/adjunct status of such secondary predicates, UD representations should not differ dramatically depending on their AAD classification. But – as discussed in the main text and illustrated in (9)–(12) – they currently do. Appendix C proposes a solution that minimises such differences – see (48)–(51) there.

B Coordination of (Un)Like Grammatical Functions

The system of relations adopted in Universal Dependencies is a “mixed functional-structural system”.¹⁶ The core vs. non-core distinction is a very coarse-grained functional distinction: some grammatical functions – especially, subject and direct object – are core, other are non-core.

While linguists do not any longer believe that only the same syntactic categories may be coordinated, and many examples of unlike category coordination are given in the main text, they assume that – apart from some well-defined exceptions to be discussed below – only the same grammatical functions may be coordinated. For example, in the ditransitive construction, the direct object cannot normally be coordinated with the other NP argument: **“John gave Mary and a book”*. As core grammatical functions are different from non-core grammatical functions, this means that core dependents cannot normally be coordinated with non-core dependents. In other words, coordinating a core dependent and a non-core dependent would result in the coordination of different grammatical functions, contrary to the overwhelming generalisation that only the same grammatical functions may be coordinated.

There are two classes of exceptions to this generalisation, both very constrained empirically. The first (pointed to us by Amir Zeldes, p.c.) is sylleptic zeugma, as in:

(40) He *made* [[his apologies]_{obj} and [for the door]_{obl}].

Such constructions, in which the two conjuncts invoke two different meanings of the head, have a meta-linguistic feel and they are easy to distinguish from genuine coordination.

The second exception is the so-called lexico-semantic coordination (Sannikov 1979, 1980), occurring mainly in Slavic and in some neighbouring languages (Paperno 2012), as in the following sentence from the National Corpus of Polish (cited here after Patejuk and Przepiórkowski 2012b: 463):¹⁷

(41) *Obiecać* można [[wszystko]_{obj} i [wszystkim]_{iobj}].
promise.INF may everything.ACC and everyone.DAT
'One may promise everything to everyone.'

As discussed in Patejuk and Przepiórkowski 2012a, 2012b and in Paperno 2012, such constructions are limited to certain classes of pronouns and quantifiers, including question pronouns (so-called *wh*-words), negative pronouns (so-called *n*-words) and pronominal-like words expressing existential or universal quantifiers (the latter illustrated in (41)). Again, such exceptional constructions are easily distinguished from run-of-the-mill cases of coordination, where the sameness of grammatical functions is preserved.

¹⁵VerbNet (Kipper et al. 2000, Kipper et al. 2006) does not seem to contain the relevant meaning of RECALL, so it is not discussed here.

¹⁶<http://universaldependencies.org/u/overview/syntax.html>

¹⁷The labels `obj` and `iobj` reflect how this example would be annotated in Polish UD treebanks.

C Open Dependents in UD

UD assumes that obligatory control only targets object-like core dependents, and not subjects or obliques. This is a reasonable first approximation, but cross-lingual facts show that it is ultimately false.

First, obligatory control into subjects, while rare, occurs in languages as diverse as Balinese and Polish. For example, Arka and Simpson 1998 argue convincingly that in the Balinese (42), in which the main verb *orahin* ‘ask’ is in the so-called objective voice (OV), the sequence *teka mai prajani* ‘come here immediately’ is the subject of this main verb and that its own subject (i.e., the subject of *teka* ‘come’) is obligatorily controlled by another dependent of the main verb, *Nyoman*.

- (42) *teka mai prajani ane orahin tiang Nyoman*
come here immediately REL OV.ask 1 Nyoman
‘Coming here immediately is what I asked Nyoman to do.’

While in Balinese control into subject clauses is related to the phenomenon of objective voice, in Polish it is a matter of lexical properties of some copular constructions (Patejuk and Przepiórkowski 2018) as well as, possibly, some (very rare) verbs, especially, *UDAĆ SIĘ* ‘succeed in, manage’, as in the following example from UD_{SZ}^{PL}:¹⁸

- (43) *Nie udało im się uruchomić ciągnika.*
NEG manage.3.SG.N them.DAT RM start.INF tractor.GEN
‘They didn’t succeed in starting the tractor.’

Such examples involve strict (not partial, etc.; Landau 2013) obligatory control into the infinitival clause. Moreover, the infinitival clause should be analysed as the subject here; while it triggers the 3rd person singular neuter ‘default agreement’ (Dziwirek 1990) with the verb, expected when the subject is non-nominative or lacks case altogether (Przepiórkowski 1999), full subject–verb agreement is witnessed when the infinitival phrase is replaced by a nominative phrase:

- (44) *Nie udał im się rozruch ciągnika.*
NEG manage.3.SG.M them.DAT RM start.NOM.SG.M tractor.GEN
‘They didn’t succeed in starting the tractor.’

Current UD guidelines do not make it possible to adequately handle control into subjects in languages such as Balinese or Polish: as controlled core dependents, such infinitival phrases should perhaps be marked as *xcomp*, but since they are subjects, they should actually be marked as *csubj*.¹⁹

In Polish, there are also clausal dependents which are obligatorily controlled despite being prototypical adjuncts. Such dependents are headed by adverbial participles, sometimes called converbs, as in (45), where the implicit subject of the participle *patrząc* ‘looking’ is obligatorily controlled by *hrabia* ‘count’, the subject of the main verb *przysiadł* ‘sat down’.

- (45) *Hrabia przysiadł, bezmyślnie patrząc przed siebie.*
count.NOM.SG.M sat.3.SG.M thoughtlessly looking before self
‘The count sat down, looking ahead thoughtlessly.’

Again, according to the current guidelines, such obligatorily controlled adverbial participial clauses may either be marked as *advcl*, losing information about control, or as *xcomp*, wrongly promoting such clauses to the status of core dependents. Recognising such open adverbial clauses is a natural step in UD: just as the *xcomp* relation is based on the eponymous grammatical function in LFG, so a new relation could be added to UD based on LFG’s *XADJUNCT* function.

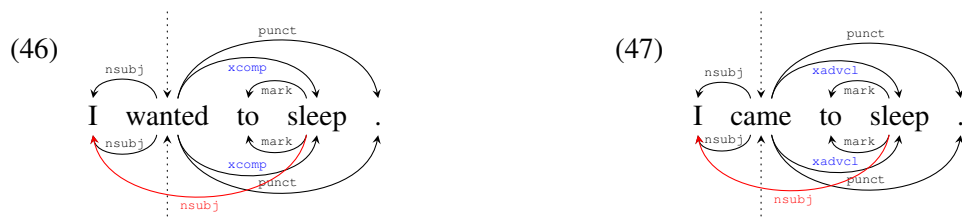
Let us note that the above considerations make clear an elegant symmetry between different kinds of dependents, one that is missing in the current UD system: just as there are three kinds of object-like dependents – nominal (*obj* and perhaps *iobj*), ‘closed’ clausal (*ccomp*) and ‘open’ – controlled – clausal (*xcomp*), the same tripartite distinction should be made within subjects and within obliques. In the case of subjects, the distinction is currently made between nominal subjects (*nsubj*) and broadly verbal subjects (*csubj*), but the examples above show that a subclass of controlled subjects should be

¹⁸The particle *SIĘ* is the so-called ‘reflexive marker’, *RM*, which – as in this case – is an inherent part of the verb, without any anaphoric meaning. *NEG* in (43) stands for ‘negative marker’.

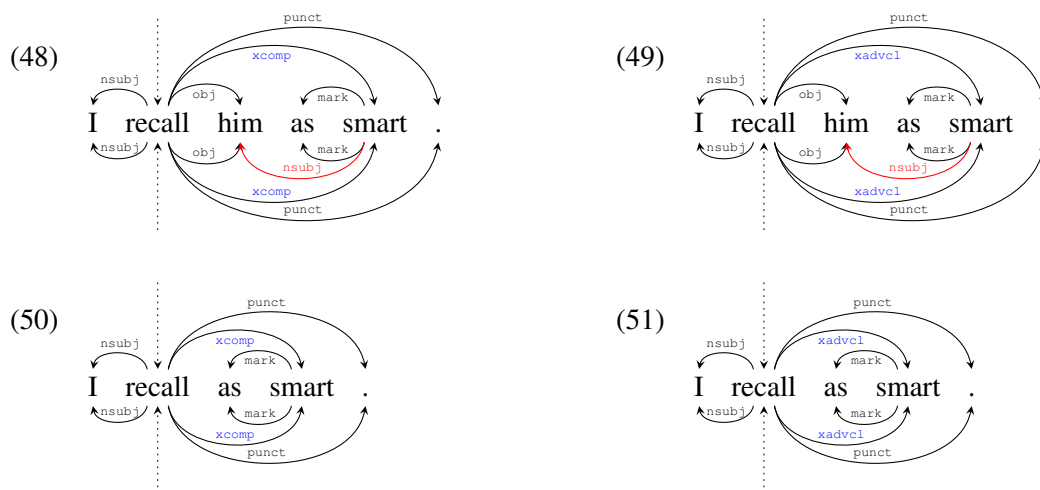
¹⁹In UD_{SZ}^{PL}, the infinitival clause in (43) is marked as an *xcomp*, thus losing information that it is the subject.

carved out of *csubj* – let us call this subclass *xsubj*. Similarly, the current class of modifier clauses should be split into closed modifier clauses – let us still call them *advcl* – and obligatorily controlled modifiers, say, *xadvcl*. This leads to the repertoire of basic dependents of verbs given in (28) in the main text.

The addition of these two relations has the effect of narrowing down the scope of *csubj* and *advcl* so that open dependents fall out of these (and into *xsubj* and *xadvcl*, respectively). Obviously, all open dependents – not just *xcomp* – are now expected to involve additional enhanced dependencies, indicating the relation between their covert subjects and some dependents of the higher predicate (usually, object or subject). This means that the difference between dependency representations (7)–(8) will now be reduced to the difference in label name:



One welcome consequence of this proposal is that the representation of secondary predicates is uniform now: object-like secondary predicates still bear the *xcomp* relation, but oblique-like secondary predicates always bear the *xadvcl* relation to the verb now, rather than bearing the *acl* relation to the predicated nominal, if it is present, and the *advcl* relation to the verb, otherwise. Also, in both cases an enhanced relation points at the subject of secondary predication (if locally present). Thus, the analysis is essentially the same, whether the secondary predicate is considered core or non-core, with the only difference being the name of one dependency label (*xcomp* or *xadvcl*); the following representations should be compared to (9)–(12) in the main text.



The symmetry between the three types of dependents – nominal, ‘closed’ clausal and ‘open’ clausal – can be made more conspicuous by renaming the labels as in (52).²⁰ However, these new names still mix two different types of information: grammatical function (*subj*, *obj* and *obl*) and grammatical category and ‘openness’ status (*n*, *c*, *x*). We propose to separate these two orthogonal types of information and make the bare grammatical function the main label of dependency relation, with categorial and ‘openness’ information given as subtypes, as in (53).

²⁰The distinction between direct and indirect objects, if needed (see §4.2), could then be handled via a subtype to the *nobj* relation, e.g., *nobj:sec*.

(52)

	subject	object	non-core
nominal	nsubj	nobj	nobl
clausal	csubj	cobj	cobl
open	xsubj	xobj	xobl

(53)

	subject	object	non-core
nominal	subj:n	obj:n	obl:n
clausal	subj:c	obj:c	obl:c
open	subj:x	obj:x	obl:x

Given this last naming scheme, the relation of the whole coordinate structure to its head becomes clear, even in the case of unlike category coordination. For example, the two conjuncts in (54) (based on (13) in the main text) are *obl:c* and *obl:n*, so the whole coordinate structure could be labelled as *obl*, and similarly for (55), (56) and (57) (based on (17), (19) and (24) in the main text).

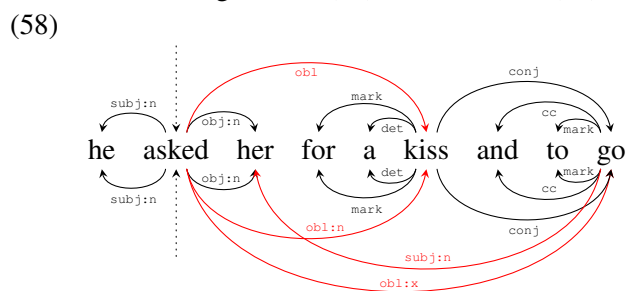
(54) At the White House, we *asked* the president [[whether Americans are safe at home]_{obl:c} and [about the hunt for Osama bin Laden]_{obl:n}]_{obl}.

(55) Campbell made two visits to the home of domestic abuse victim Miss A, during which he *asked* her [[for a kiss]_{obl:n} and [to go on a date with him]_{obl:x}]_{obl}.

(56) I do *remember* [[a lot of wine bottles]_{obj:n} and [that Felix spoke almost nothing]_{obj:c}]_{obj}.

(57) Homeless people *need* [[a work ethic]_{obj:n} and [to be self-reliant]_{obj:x}]_{obj}, Bender said.

Once the syntactic category of a dependent is expressed by a subtype, an unlike category coordination dependent could bear a relation which does not mention such a subtype. For example, the representation of the relevant fragment of (55) could be as in (58).



As in the case of the previous dependency structures, the differences between the basic representation (at the top) and the enhanced representation (at the bottom) are marked in red. Thus, while the enhanced representation contains dependency edges from *asked* to particular conjuncts, labelled as *obl:n* (*for a kiss*) and *obl:x* (*to go*), the basic representation contains just one edge labelled as *obl*. Additionally, the enhanced representation contains the explicit control information in the form of the *subj:n* dependency from the second conjunct to the controller *her*. This way it is possible to represent in UD the possibility of “control into selected conjuncts”, somewhat problematic for some linguistic theories (Patejuk and Przepiórkowski 2014).

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